Bulletin

UNDERGRADUATE PROGRAMS
2020–2021

ILLINOIS TECH | Discover. Create. Solve.

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FOREWORD

ILLINOIS TECH EXPRESSLY RESERVES THE RIGHT, AT ITS SOLE DISCRETION, TO REVIEW AND TO MODIFY THE REGULATIONS, POLICIES, PROCEDURES AND REQUIREMENTS SET FORTH IN THIS BULLETIN AT ANY TIME AND FOR ANY REASON, WITHOUT PRIOR NOTICE OR CONSULTATION OR CONSIDERATION OR LIABILITY OF ANY KIND. TO BE CLEAR, THIS INCLUDES THE MEANS AND METHODS BY WHICH INSTRUCTION IS DELIVERED. ANY SUCH CHANGES WILL BE PUBLISHED IN THE WEB VERSION OF THIS BULLETIN WHICH CAN BE FOUND AT http://bulletin.iit.edu, AND ANY SUCH CHANGES SHALL BECOME EFFECTIVE UPON PUBLICATION. THE VERSION OF THIS BULLETIN SO POSTED ON THE WEBSITE SHALL BE DEEMED, FOR ALL PURPOSES, THE MOST CURRENT VERSION, AND IT SHALL GOVERN AND CONTROL IN ALL INSTANCES, MEANING THAT IN THE EVENT OF A CONFLICT BETWEEN ANY PRINTED VERSIONS OF THIS BULLETIN OR ANY EARLIER POSTED VERSIONS OF THIS BULLETIN AND THE THEN-CURRENTLY POSTED VERSION OF THIS BULLETIN ON THE WEBSITE, THE CURRENTLY POSTED VERSION OF THIS BULLETIN ON THE WEBSITE SHALL GOVERN AND CONTROL.

Purpose of the Illinois Institute of Technology Undergraduate Bulletin

This bulletin describes the academic programs and resources, policies, procedures, and student services in effect at the time of publication. It is a primary source of information for undergraduate students, faculty, and the administration.

General information regarding the history of the university, the setting of the campus, and campus life is also included. These sections can be used by prospective students and others to gain an understanding of the university as a whole.

The programs described in this bulletin are applicable to those students who enter Illinois Institute of Technology in the academic year 2020–2021. Students follow the programs described in the bulletin in effect at the time of their first registration.

Changes in programs and policies often occur before a new bulletin is published. A faculty adviser from the student's major department is the best source for current curriculum information. The Office of Undergraduate Academic Affairs can refer students to the appropriate administrative office for current policies and procedures. Many policies in this bulletin are also found at iit.edu/registrar.

Illinois Institute of Technology is a multicultural community that values and respects its members. We take pride in the fact that our faculty, staff, and students come from various backgrounds and all parts of the world, and we welcome their diverse perspectives and contributions. It is our policy to provide a working and learning environment in which faculty, staff, and students are able to realize their full potential as productive members of the university community.

To this end, Illinois Institute of Technology affirms its commitment to equal opportunity and nondiscrimination in employment and education for all qualified individuals regardless of race, religion, color, national origin, gender, age, sexual orientation, gender identity, disability, applicable veteran status, or any other characteristic protected by applicable federal, state, or local law. Further, the university is committed to taking affirmative action to increase opportunities at all levels of employment and to increase opportunities for participation in programs and activities by all faculty, staff, and students.

Every member of the Illinois Institute of Technology community: faculty, staff, and student, is expected to cooperate fully in meeting these goals.

Any student, applicant, or employee of Illinois Institute of Technology who believes that they have received inequitable treatment because of discrimination violating the university's stated policy of equal opportunity in employment and in education should communicate, either in writing or in person, with the Director, Equal Employment Opportunity and Affirmative Action, IIT Tower, Illinois Institute of Technology.

For descriptions of graduate programs and courses, see the *Illinois Tech Bulletin: Graduate Programs* or visit the website web.iit.edu/gaa. For descriptions of law programs and courses, see the Chicago-Kent College of Law website (kentlaw.iit.edu).

The information in this bulletin is subject to change without notice. Changes will be duly published. See iit.edu.

Illinois Institute of Technology
10 W. 35th St.
Chicago, IL 60616-3793

UNIVERSITY OVERVIEW

Accreditation

Illinois Institute of Technology is accredited by the Higher Learning Commission (hlcommission.org).

Specific professional curricula are accredited by the Engineering Accreditation Commission and the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology, American Psychological Association, Council on Rehabilitation Education, American Bar Association, Association of American Law Schools, The Association to Advance Collegiate Schools of Business, National Architectural Accrediting Board, and the Landscape Architectural Accreditation Board.

Administration and Colleges

Board of Trustees (web.iit.edu/president/board-trustees)

Alan W. Cramb, President
Office of the President (web.iit.edu/president)

Peter Kilpatrick, Provost and Senior Vice President for Academic Affairs
Office of the Provost (web.iit.edu/provost)

John F. O. Bilson, Dean, Stuart School of Business

Kenneth T. Christensen, Dean, Armour College of Engineering

Lance Fortnow, Dean, College of Computing

Christine Himes, Interim Dean, Lewis College of Science and Letters

Reed Kroloff, Dean, College of Architecture

Anita K. Krug, Chicago-Kent College of Law

Denis Weil, Dean, Institute of Design

Academic Calendar

Website: web.iit.edu/registrar/academic-calendar

The official academic calendar for Illinois Institute of Technology, including dates for class registration, midterm and final grades, final exams, and degree conferral, is located on the Office of the Registrar's website.

Undergraduate Academic Affairs

Website: iit.edu/ugaa

Michael Gosz, Vice President for Enrollment and Senior Vice Provost

Undergraduate Academic Affairs falls under the leadership of the Vice President for Enrollment and Senior Vice Provost, Dr. Michael Gosz. As vice president, Dr. Gosz is responsible for Undergraduate Academic Affairs, Office of the Registrar, the Academic Resource Center (ARC), and undergraduate student affairs in general. The services provided by the offices overseen by Dr. Gosz enhance the educational experience of undergraduate students.

Undergraduate Academic Affairs

The Office of Undergraduate Academic Affairs (UGAA) provides a variety of academic support services for all undergraduate students from the time of admission to graduation. These services include academic advising; evaluation of transfer credits from both United States and international schools; academic program audits; student petitions; course repeats for a change of grade; change of major; monitoring of academic progress; certification of student's eligibility for degree conferral; granting an official leave of absence; and official withdrawal from the university. In addition, this office reinstates former undergraduate students to the university and maintains the official academic files for all undergraduate students. Degree Works, the online degree audit system, is monitored and maintained by the Office of Undergraduate Academic Affairs.

Forty-one separate Bachelor of Science (B.S.) degrees and three professional Bachelors degrees are offered.

Research

Faculty and students engage in research across a range of disciplines through institutes, centers, and programs, as represented by those described below. More information is available on the Research at Illinois Tech website (research.iit.edu).

Research Institutes

IIT Research Institute (IITRI)
The Institute for Food Safety and Health
The Pritzker Institute of Biomedical Science and Engineering
Wanger Institute for Sustainable Energy Research (WISER)

Research Centers

The Center for Accelerator and Particle Physics (CAPP)
Center for Complex Systems and Dynamics (CCSD)
Center for Electrochemical Science and Engineering
Center of Excellence in Polymer Science & Engineering (CEPSE)
The Center for Financial Innovation
Center for Integrative Neuroscience and Neuroengineering Research
Center for Molecular Study of Condensed Soft Matter
Center for Nutrition Research
Center for Processing Innovation
Center for Specialty Programs
The Center for Strategic Competitiveness (CSC)
Center for the Study of Ethics in the Professions (CSEP)
Center for Synchrotron Radiation Research and Instrumentation
Sustainable Transportation and Infrastructure Research Center (STAIR)
Electric Power and Power Electronics Center (EPPEC)
Engineering Center for Diabetes Research and Education (ECDRE)
International Center for Sensor Science and Engineering (ICSSE)
Medical Imaging Research Center (MIRC)
National Center for Food Safety and Technology
Robert W. Galvin Center for Electricity Innovation
Thermal Processing Technology Center (TPTC)
Wireless Network and Communications Research Center (WiNCom)

Service, Education, and Outreach Centers

Energy/Environment/Economics (E3)
The Center for Research and Service
The Center for Sustainable Enterprise
Grainger Power Engineering Laboratory (GPEL)
Institute for Science, Law & Technology
The Invention Center
The Office of Technology Development (OTD)

Illinois Institute of Technology History and Campuses

In 1890, when advanced education was often reserved for society's elite, Chicago minister Frank Wakely Gunsaulus delivered what came to be known as the "Million Dollar Sermon." From the pulpit of his South Side church, near the site Illinois Institute of Technology now occupies, Gunsaulus said that with a million dollars he could build a school where students of all backgrounds could prepare for meaningful roles in a changing industrial society.

Inspired by Gunsaulus's vision, Philip Danforth Armour Sr. (1832–1901) gave $1 million to found Armour Institute. Armour, his wife, Malvina Belle Ogden Armour (1842–1927), and their son J. (Jonathan) Ogden Armour (1863–1927) continued to support the university in its early years. When Armour Institute opened in 1893, it offered professional courses in engineering, chemistry, architecture, and library science.

Illinois Tech was created in 1940 by the merger of Armour Institute and Lewis Institute. Located on the west side of Chicago, Lewis Institute, established in 1895 by the estate of hardware merchant and investor Allen C. Lewis, offered liberal arts as well as science and engineering courses for both men and women. At separate meetings held by their respective boards on October 26, 1939, the trustees of Armour and Lewis voted to merge the two colleges. A Cook County circuit court decision on April 23, 1940, solidified the merger.

The Institute of Design (ID), founded in Chicago by Làszlò Moholy-Nagy in 1937, merged with Illinois Tech in 1949.

Chicago-Kent College of Law, founded in 1887, became part of the university in 1969, making Illinois Institute of Technology one of the few technology-based universities with a law school.

Also in 1969, Stuart School of Management and Finance—now known as Stuart School of Business—was established thanks to a gift from the estate of Lewis Institute alumnus and Chicago financier Harold Leonard Stuart. The program became Stuart School of Business in 1999.

The Midwest College of Engineering, founded in 1967, joined the university in 1986, giving Illinois Tech a presence in west suburban Wheaton with what is today known as Rice Campus—home to Illinois Tech's School of Applied Technology.

In December 2006 University Technology Park at Illinois Institute of Technology, an incubator and life sciences/tech startup facility, was started in existing research buildings located on the south end of Mies Campus. University Technology Park is now home to many companies.

Today, Illinois Tech is a private, technology-focused, Ph.D.-granting research university—the only university of its kind in Chicago. Its Chicago location offers students access to the world-class resources of a great global metropolis. It offers undergraduate and graduate degrees in engineering, science, architecture, business, design, human sciences, applied technology, and law. One of 21 institutions that comprise the Association of Independent Technological Universities (AITU), Illinois Tech provides an exceptional education centered on active learning, and its graduates lead the state and much of the nation in economic prosperity. Illinois Tech uniquely prepares students to succeed in professions that require technological sophistication, an innovative mindset, and an entrepreneurial spirit.

The university has four campuses in the Chicago area. The 120-acre Mies Campus, centered at 33rd and State streets in Chicago, as well as many of its buildings, were designed by Ludwig Mies van der Rohe, who directed the architecture program at Illinois Tech from 1938–1958 and was one of the twentieth century's most influential architects. S. R. Crown Hall, home of Illinois Tech College of Architecture, was named a National Historic Landmark in 2001, and part of the Illinois Tech Mies Campus was entered into the National Register of Historic Places in 2005.

Chicago and Its Environs

Chicago is world renowned for its museums and architecture, and offers exceptional career and internship opportunities in all of Illinois Tech's fields of study. The city and its surroundings form an international center of finance and law, a manufacturing and transportation hub, and the home of two national research laboratories (Argonne National Laboratory and Fermi National Accelerator Laboratory), as well as numerous medical facilities and corporate headquarters.

Diversions range from a world-class symphony orchestra to major league sports teams. Located on the southwestern shore of Lake Michigan, Chicago boasts miles of attractive beaches and parks for jogging, biking, swimming, and boating. Ethnic neighborhoods throughout the city provide an international array of cultures and cuisine. Chicago is also rich in live theater, and music clubs abound.

Student Demographics

A Snapshot of the Illinois Institute of Technology Community

Enrollment (Fall 2019)	
Undergraduate	3,026 students
Graduate	2,845 students
Law	882 students
Continuing Education	87 students
Total	**6,840 students**

Student Demographics	
Male	63%
Female	37%
Minority[1]	16%
International	42%
Countries of Origin	93
Student/Faculty Ratio	12:1

Degrees Awarded 2018-2019	
Bachelor	559
Master	1,670
First Professional	234
Ph.D.	92
Certificates	11
Total	**2,566**

1 Minorities include domestic students with the following ethnicities: American Indian or Alaskan Native, Black or African American, Hispanic/Latino of any race, Native Hawaiian or Pacific Islander, and Two or more races.

UNDERGRADUATE ADMISSION

Classification of Students

The Office of Undergraduate Admission is responsible for admission decisions for all undergraduate students: full-time and part-time, non-degree and degree-seeking, post baccalaureate, joint program, visiting, and dual admission.

Students should contact:

Office of Undergraduate Admission
10 W. 33rd St.
Perlstein Hall 101
Chicago, IL 60616
Telephone: 312.567.3025
Outside Chicago: 800.448.2329
Fax: 312.567.6939
E-mail: admission@iit.edu

Online application: apply.iit.edu
Web: admission.iit.edu

Classification

A student registered for 12 credit hours or more is classified as a full-time student. A student registered for less than 12 credit hours is classified as a part-time student.

Acceptance of Admission/Enrollment Deposit

Students must submit a non-refundable matriculation deposit. This deposit is credited to the student's account and will go toward the cost of attendance.

New Student Fee

First time undergraduate students are charged a one-time fee to cover the costs of orientation activities for their first term of enrollment.

Campus Locations

Students can take courses at either the Mies Campus or the Daniel F. and Ada L. Rice Campus in Wheaton, a Chicago suburb. The Mies Campus has the most extensive offering of day and evening classes. The Rice Campus offers evening classes, most of which start at 6:25 p.m. The majority of undergraduate courses taught at the Rice Campus are 300- and 400-level courses both in information technology and management and in industrial technology and management.

The Office of Digital Learning produces, delivers, and supports university courses, lectures and programs using educational technology. Through the Office of Digital Learning, academic departments offer 28 distance education degree and certificate programs to the university community around the world. Please note that undergraduate students must have departmental approval to register in online course sections.

Application as a First-Year Student

Special programs and scholarships have specific deadlines and supplemental applications. See admission.iit.edu for details.

Applicants must submit a non-refundable application fee, a completed application, transcripts from all high schools attended, transcripts of all colleges (where applicable), and standardized test scores (ACT or SAT I). International students should see additional requirements in the International Student section (p. 10). The application is available online at apply.iit.edu.

Standardized Test Scores for First-Year Students

All students are required to submit scores from either the College Entrance Examination Board's Scholastic Aptitude Test (SAT I Reasoning) or the American College Test (ACT). The university will consider SAT II tests in math and science but does not require them for admission or scholarship applications.

High School Requirements for First-Year Students

Graduates from an accredited high school applying for admission must present evidence that they have completed a minimum of 16 units of high school work. Most admitted students exceed this minimum. A unit may be defined broadly as the study of a major subject for one academic year in high school.

High school studies should provide a sound background for college study. Preparation in mathematics, for example, must have sufficient depth in geometry, trigonometry, and especially in algebra, to permit applicants for science and engineering programs to immediately begin the study of college-level calculus and analytical geometry.

A background in English must prepare a student to write well and to read intelligently and analytically, with depth and sensitivity of comprehension.

Required

- Four years of English
- Four years of mathematics
- Three years of science, including lab[1]

[1] Material should include two of the following areas: biology, chemistry, or physics.

College Coursework Taken While Still in High School

Illinois Institute of Technology will accept college coursework taken while still in high school from other accredited universities and colleges, provided that the courses are comparable in nature, content, and level to those offered at Illinois Tech. Grades must be equivalent to a "C" or higher. Grades of "C-" are not acceptable for transfer credit. Official transcripts of all college work are required to be submitted as part of the application for admission to the Office of Undergraduate Admission, regardless of the transferability of credits.

Application as an International Student

International students are those who are neither citizens nor permanent residents of the United States. Though the required admission documents can vary depending upon individual circumstances, all international applicants must submit a non-refundable application fee, a completed application for admission, official transcripts in the native language, certified English translation of all transcripts, proof of English proficiency, and an affidavit of financial support. Please read the appropriate application requirements for first-year or transfer students. Prospective applicants should carefully read the description of requirements on the Undergraduate Admission website (apply.iit.edu).

English Proficiency

All international students must demonstrate proficiency in English by submitting a TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System). The minimum total scores for each examination are listed in the table below along with any additional requirements:

Test Scores	English Requirement
TOEFL Composite of 69 or lower IELTS Composite of 5.0 or lower Duolingo English Test <95 No TOEFL/IELTS score submitted	Students will be required to attend Illinois Tech's Intensive English Program and complete through level 4 before beginning academic classes. Students take an English assessment when they arrive to campus and based on their results are placed into the appropriate English level (1-4).
TOEFL Composite of 70-89 IELTS Composite of 5.5-6.0 Duolingo Engish Test 95-109	Students will be required to take an English assessment when they arrive to campus. Based on the results, students may be required to take PESL classes concurrently with academic classes. Students who do not demonstrate the ability to be successful in PESL courses will need to complete the Intensive English Program (IEP). Students may need to take summer academic courses to graduate within the time/semesters indicated for their academic program.
TOEFL Composite of 90 or higher IELTS Composite of 6.5 or higher Duolingo English Test* 110 or higher	Meets admission criteria and no additional English assessments required.

On the PTE Academic Test, students must earn a 53 or better.

*Students who are submitting the Duolingo English Test will be required to take an English Language Assessment on campus. If supplemental English is recommended, students will be encouraged to complete courses with English Language Services.

By accepting admission to the university, the student is agreeing to take any additional English courses that Illinois Institute of Technology deems necessary. Academic departments always reserve the right to require an English language assessment from any applicant.

Students who have studied in countries where English is the native language and students who achieve certain scores on the SAT I or ACT exam may also be considered for a waiver of the English proficiency test requirement. More details on these waiver conditions are available at: admissions.iit.edu/undergraduate/apply/international-student-english-proficiency-requirement.

Conditional English Admission

Applicants who meet academic requirements but do not meet the minimum English proficiency requirements may be offered conditional admission. These students will be referred to Illinois Tech's Intensive English Program (IEP), and will be offered unconditional admission upon successful completion of the IEP program as outlined at english.iit.edu/iep.

Students who pursue English studies at select other English language institutions will also be eligible to receive unconditional admission upon completion of their studies. More details about the Conditional English Admission program are available at admissions.iit.edu/undergraduate/apply/conditional-english-admission.

Application as a Transfer, Visiting, or Exchange Student

The Office of Undergraduate Admission is responsible for admission decisions for transfer, visiting, and exchange students. Transfer, visiting, and exchange students may apply for the fall or spring term in all majors. See admission.iit.edu for deadlines.

The transfer application may be obtained by visiting apply.iit.edu. Students must submit the Illinois Tech Transfer Application, a non-refundable application fee, and transcripts for all colleges and universities attended.

International students should see additional requirements in the International Student section.

Requirements for Transfer Students

Transfer applicants must be in good academic standing at their previous college(s) to be considered for admission to the university. Admission is based upon a cumulative grade point average (GPA) and individual grades in all classes that apply to the major selected. A minimum cumulative GPA of 3.00 is recommended for transfer consideration. Students on academic probation, or who have been dismissed for academic or other reasons, will not be considered for transfer. Students must also be in good financial standing at all previous colleges attended.

Transfer applicants with fewer than 30 credit hours of transferable graded college coursework may be required to submit high school transcripts and SAT I or ACT scores as part of their application.

Application as a Non-Degree-Seeking Student

Applicants who are taking courses for the following reasons will be limited to part-time enrollment:

- Taking courses for professional development
- Taking courses prior to being admitted to a graduate program
- Taking courses to transfer to another institution

A non-degree-seeking student must be admitted to the university. Admission is based on prerequisite coursework or other preparation necessary for the intended course. Non-degree-seeking students can read the description of admission requirements on the Undergraduate Admission website (admissions.iit.edu/undergraduate/).

Transfer of College-Level Credit

Transfer Credit

Official transfer credit evaluations are completed only after a student is admitted to the university and only from official college transcripts. Courses may be acceptable for transfer from accredited colleges and universities, provided they are comparable in nature, content, and level to those offered at Illinois Institute of Technology. Credit may also be accepted, based on appropriate documentation, for DANTES, military experience, and CLEP (p. 435). The university does not grant credit for vocational courses or life/work experience. In addition, technology courses will not be accepted in any engineering program.

A maximum of 68 applicable credit hours of transfer credit is permitted from a two-year college. There is no maximum number of hours of transfer credit from a four-year college; however, the final 45 semester hours of any degree program must be completed at Illinois Institute of Technology. Transfer credit will be accepted for courses completed with the equivalent of a grade of "C" or better. A grade of "C-" is not acceptable for transfer credit. Grades from transfer courses are not included in the Illinois Institute of Technology cumulative or major grade point average. In certain instances, the academic department must approve transfer credit if a long period of time has elapsed since the course was completed.

Contact the Office of Undergraduate Admission (admission@iit.edu (ugaa@iit.edu)) regarding the transfer of courses from any college or university.

Advanced Placement Examinations

Illinois Institute of Technology will award credit for CEEB Advanced Placement (AP) examinations. Credit will vary by test score. A complete list of acceptable AP scores and Illinois Tech course equivalents may be found at iit.edu/ugaa.

International Baccalaureate Program

Students holding an International Baccalaureate (I.B.) diploma or who have successfully completed I.B. examinations may be awarded credit according to the following policies: college credit will be awarded for higher-level (HL) exams with a score of four or better; a maximum of 10 semester hours of credit for each HL exam can be awarded; and no credit is granted for work completed at the subsidiary level (SL). Scores should be sent to the Office of Undergraduate Academic Affairs (ugaa@iit.edu).

General Certificate of Education Examination - Advanced Level and Advanced Subsidiary Level

College credit will be awarded for General Certification of Education (GCE) examinations with a grade of "A", "B", "C", "D", and "E". A maximum of 10 credit hours can be awarded for each advanced level (A-level) examination. A maximum of five credit hours can be awarded for each advanced subsidiary level (AS-level) examination.

Placement Assessments

Placement assessments are done prior to first enrollment. For students entering in the fall semester, placement assessments are scheduled in the summer preceding matriculation. For students entering in the spring semester, placement assessments are scheduled immediately preceding matriculation. Placement assessments are only used for placing students into the appropriate courses. Assessment results do not appear on the student's official academic record and no academic credit is awarded. Placement assessment information is available through Blackboard Organizations. More details are available here.

Students are required to take up to three placement exams.

- All new first-year and transfer students who do not yet have credit for MATH 151 are required to take the mathematics placement assessment online. Subsequent Advanced Placement credit or transfer credit for MATH 151 will override the mathematics placement result.
- All new first-year and transfer students who do not yet have credit for COM 101 are required to demonstrate writing proficiency in one of three ways. Students may either pass the writing proficiency assessment prior to enrollment based on satisfactory SAT or ACT writing sub-scores, or by submitting a satisfactory essay when requested, or by passing COM 101 during their first year of attendance.
- Students in chemical engineering who have neither Advanced Placement credit nor transfer credit for CHEM 124 have the option to take the CHEM 124 proficiency assessment to waive the class, but no credit will be awarded.

Immunization and Proof of Immunity

Illinois Institute of Technology is required to collect student immunization records and provide this information to the Illinois Department of Public Health, or its designated representative, in the event of a health emergency or compliance audit. All immunization documents submitted to the university become the property of the university. Unless required to do so by law, the university will not release student immunization records to any third party. Limited exemptions from showing proof of immunity can be accepted with official supporting documentation. In accordance with public health law, anyone with an exemption may be excluded from campus in the event of a health emergency. Additional proof of immunity for specific health conditions is required of international students who are not otherwise exempt. Students who do not comply with these requirements prior to, or during their first term of study, will be prevented from registering for subsequent terms. Questions regarding the immunization policy should be directed to the Student Health and Wellness Center at 312.567.7550 or iit.edu/shwc.

FINANCIAL INFORMATION

Financial Aid

Website: iit.edu/financial-aid

Illinois Institute of Technology's Office of Financial Aid provides institutional and federal financial assistance for students and families.

Mission Statement

The financial aid team strives to educate, empower, and support students with an understanding of financial aid options and resources in approachable environment.

Comprehensive Aid Program

Illinois Institute of Technology administers a comprehensive financial aid program which includes federal, state, and institutional funds for full- and part-time undergraduate students. Federal programs include grants, loans, and work-study employment. State programs include grant funds. Most federal and state funds are based on demonstrated financial need. The university uses the formula established by the U.S. Congress to determine financial need for assistance. Institutional funds include need-based grants and loans, as well as merit scholarships based on academic and service achievements. Private loans are also available and are based on credit approval from the lender.

Student Eligibility Requirements to Receive Federal and State Financial Assistance

Students must be U.S. citizens or eligible non-citizens, be enrolled in a degree-seeking program at least half-time (4.5 credit hours or more per semester for graduates, 6 credit hours or more per semester for undergraduates), and demonstrate academic progress towards graduation to qualify for federal and state aid. In some circumstances, undergraduates enrolled in fewer than six credit hours will be eligible for federal or state grants. Satisfactory Academic Progress (SAP) includes a minimum grade point average, a sufficient percentage of credit hours earned each semester, and timely progress towards the completion of a degree program. The university has an established SAP policy in compliance with federal and state regulations. Failure to comply with the university's SAP policy will lead to a student losing their eligibility for federal and state financial assistance. **International students are not eligible for federal financial aid.**

Federal Financial Aid Application Process

All students applying for financial assistance must complete the Free Application for Federal Student Aid (FAFSA). This application is available at fafsa.ed.gov beginning October of the academic year prior to the academic year in which the student plans to attend. Illinois Institute of Technology's Title IV School Code is **001691**. All federal financial assistance is awarded on an annual basis, hence a FAFSA must be filed each academic year. Students are encouraged to file a FAFSA at their earliest convenience because some state and campus-based awards are awarded on a first-come first-served basis. The amount of financial aid a student receives each year depends on demonstrated financial need and the availability of funds. Students applying for federal financial aid may be required to submit income information to the Office of Financial Aid.

New students should not wait for a final admission decision before filing the FAFSA. Applicants are encouraged to complete a FAFSA at their earliest convenience in order to qualify for potential state and campus-based funds.

Determining Financial Need for Assistance

Financial need is the difference between a student's total cost of attendance (COA) at the university and the student's expected family contribution (EFC). The total COA at the university includes tuition, mandatory fees, room and board, books and supplies, transportation, loan fees, and personal expenses. The U.S. Department of Education has established the formula used to calculate the EFC based on the FAFSA information provided by a student and (if applicable) his/her family. One of the principles of need-based assistance is that students and their families are expected to help pay some of a student's educational expenses.

Federal Financial Aid Programs

Federal Pell Grant

The Federal Pell Grant is a grant that does not have to be repaid. Pell Grants are awarded only to undergraduate students who have not earned a bachelor's or professional degree. Pell Grants are awarded based on demonstrated financial need. Students apply for a Pell Grant by filing the FAFSA.

Federal Supplemental Educational Opportunity Grant (FSEOG)

The FSEOG is a federal campus-based grant that does not have to be repaid. This grant is awarded to undergraduate students who demonstrate exceptional financial need. FSEOG funds are limited and may be awarded on a first-come, first-served basis. The final need criteria for this award are determined each year by the Office of Financial Aid.

Federal Work-Study Program

The Federal Work-Study (FWS) program provides campus-based job funding for students with demonstrated financial need. Students awarded FWS can earn money to help pay educational expenses. Eligible students are responsible for finding employment. Students can work either on or off-campus. Off-campus jobs will be with private, non-profit organizations or public agencies that provide community service work. Students awarded FWS are paid the current federal minimum wage or higher depending on the type of work performed. Students are paid by the hour and receive a biweekly paycheck. FWS students cannot work more than 20 hours per week during the academic year and may not work during their scheduled class times. FWS positions are advertised by the Office of Student Employment through the Handshake platform.

Direct Loan Programs

Illinois Institute of Technology participates in the Direct Loan program with the Department of Education. Fixed interest rates for the loans in this program are determined each year on July 1 by Congress. The funds for these loans come from the federal government. Below are the types of Direct Loan programs offered to students at the university.

Federal Direct Stafford Loans (Subsidized and Unsubsidized)

The Subsidized Stafford Loan is awarded to undergraduate students based on demonstrated financial need. Interest does not accrue while the student is enrolled at least half-time. The Unsubsidized Stafford Loan is a non-need based loan awarded to both undergraduate and graduate students. Interest accrues from the time the student receives the loan funds. Students have the option of paying the interest while enrolled or having the interest added to the principal upon graduation or after dropping to less than half-time enrollment. Both Stafford Loans are charged an origination fee each year before the loan disburses to the student.

Federal Direct PLUS Loans

PLUS Loans enable parents and graduate students with good standing credit to borrow money to help cover educational expenses. If a borrower is denied for this loan, they may reapply with an endorser. If a parent is not approved for the loan, the Office of Financial Aid may offer additional Unsubsidized Stafford Loan funds to an undergraduate. PLUS Loans cannot be taken in an undergraduate student's name.

State Financial Aid Programs

Monetary Award Program (MAP)

This program, which is awarded by the Illinois Student Assistance Commission (ISAC), is awarded to undergraduate Illinois residents with demonstrated financial need. To receive a MAP Grant, a student must demonstrate financial need, be a resident of Illinois, and be seeking their first bachelor's degree. The MAP Grant can only be applied to mandatory tuition and fees and is awarded on a per-credit-hour basis. Graduate courses and Kent Law courses are ineligible for MAP Grant funding. A student can receive the MAP Grant for up to a maximum of 135 credit hours. All students awarded the MAP Grant must provide proof of Illinois residency. Students do not need to repay their MAP Grants. **MAP Grants are subject to state appropriations.**

Institutional Financial Aid Programs

Most undergraduate students at the university receive some sort of institutional support, based on merit or need. The Office of Undergraduate Admission awards institutional funds up front to new admits and the Office of Financial Aid administers the renewal of scholarships each year. Generally, scholarships are awarded for up to four years of study. Students must be full-time (at least 12 credit hours each term) to receive institutional scholarship funds. Some university scholarships have additional requirements and will be specified to the student at the time of awarding.

Veterans' Educational Benefits

The Illinois Institute of Technology proudly participates in administering the Montgomery GI Bill®, Post 9/11 GI Bill®, and the Yellow Ribbon® Program. Beneficiaries who plan to utilize VA benefits at the university can find all relevant information on the Office of Financial Aid's website. For the first semester using benefits, students must submit a copy of their Certificate of Eligibility and complete the Veteran Benefit Process Application. Any documentation or questions can be directed to the School Certifying Official (SCO) by emailing veterans@iit.edu or calling 312.567.7952. Beneficiaries should keep in mind that VA benefits can only be utilized for courses that are required for their academic program. Additionally, beneficiaries must maintain reasonable academic progress according to university standards. Failure to meet minimum-progress criteria can result in the loss of eligibility for educational benefits.

Taxation of Scholarships, Fellowships, and Stipends

U.S. Citizen or Resident Alien

A scholarship/fellowship payment received by a candidate for degree is generally not taxable income to the student if it is used for qualified expenses. Qualified expenses are defined by the Internal Revenue Service (IRS) and include tuition and required fees, and/or books, supplies, and equipment required of all students in the course. These payments do not need to be reported to the IRS by the student or Illinois Institute of Technology.

A scholarship/fellowship used for expenses other than qualified expenses is taxable income and includes payments that are used for living and incidental expenses such as room and board (housing), travel, research, clerical assistance, or equipment and other expenses that are not required for enrollment or attendance.

Although these payments are taxable income to the U.S. citizen or resident alien student, the IRS does not require the university to withhold tax on the payment. In addition, the university is not required to report these payments to the IRS. However, students are responsible for reporting these payments and remitting any tax due with their personal income tax returns.

Since the university cannot advise students regarding their personal tax matters, the student should consult with their personal tax adviser regarding the reporting of their scholarship/fellowship or stipend on their tax return.

International Student

The Internal Revenue Service (IRS) is the U.S. government agency that administers U.S. tax laws and collects taxes from individuals receiving payments in the United States. The U.S. tax system is based on a calendar year (January 1 through December 31).

The IRS requires that the university apply specific federal tax withholding and reporting rules to payments made to international students.

A scholarship/fellowship payment received by an international student who is a candidate for a degree is generally not taxable income to the student if it is used for qualified expenses. Qualified expenses are defined by the IRS and include tuition and required fees, and/or books, supplies, and equipment required of all students in the course. These payments do not need to be reported to the IRS by the student or the university.

A scholarship/fellowship used for expenses other than qualified expenses is taxable income and includes payments that are used for living and incidental expenses such as room and board (housing), travel, research, clerical assistance, or equipment and other expenses that are not required for enrollment or attendance. For these types of scholarships, international students with an F, J, M, or Q visa are subject to 14% federal tax withholding unless their country of residency has a tax treaty with the United States that excludes scholarships/fellowships from taxation. Payments made to international students in any other immigration status are subject to 30% withholding.

Since the university cannot advise students regarding their personal tax matters, the student should consult with their personal tax adviser regarding the reporting of their scholarship/fellowship on their tax return.

Student Accounting

Website: web.iit.edu/student-accounting

Financial Responsibility

Students take financial responsibility for the payment of all education related charges and fees that become a part of their student account when those charges are due regardless of their expected reliance on third-party resources such as financial aid, family gifts, employer reimbursement, private loans, outside scholarship or sponsorship. Any balance due to the university as the result of adjustments made to estimated or confirmed financial aid, the refusal to apply for any or all of the student's financial aid, or the inability to complete the financial aid verification become the student's responsibility for payment. Students agree to supply the Office of Financial Aid with any reasonable information or documents that they may request to complete the verification process in a timely manner. Students acknowledge that any outstanding balance due on their student account that is not paid when due is subject to service charges in the amounts or at the rates established and published by the university from time to time and that they will be prevented from registering for additional courses or obtaining official documents such as diplomas or transcripts until that outstanding balance has been paid in full. Failure to pay a past due debt may result in the debt being listed with the State Comptroller's Offset Program, referred to a collection agency, and/or other authorized legal debt collection procedures. Under such circumstances, the student is responsible for all fees and costs incurred by the university in the collection of the past due debt, including collection fees and/or attorney's fees.

Charges

All university mandatory and non-mandatory charges are published regularly. The official university publication of current tuition, fees, and other charges for all students can be found at web.iit.edu/student-accounting on the Tuition and Fees page. All other published tuition and fee information should be considered an estimate and not the official published rates. Continually rising costs do not permit the university to guarantee that published charges will not change. Students and parents should anticipate periodic increases in the future.

Graduate Admission Application Fee

All first time applications for graduate admission must be accompanied by a non-refundable fee. Any applicant who has attended Illinois Institute of Technology previously, or who has already paid an application fee to the university, does not have to pay a second application fee. Please contact the appropriate program admissions office for any applicable fee.

Enrollment Deposit

Each admitted undergraduate student is required to make a non-refundable enrollment deposit, which is credited toward the student's cost of attendance and holds a place for the initial semester of enrollment. This deposit will disburse on the first day of class and will appear on the billing statement for the semester.

Each student admitted as a full-time degree-seeking graduate student to certain programs is required to make a non-refundable enrollment deposit, which is credited toward the student's cost of attendance and holds a place for the initial semester of enrollment.

Undergraduate Tuition

Undergraduates registered for 12-24 credit hours are considered full-time and will be charged full-time tuition and fees. Undergraduates registered for fewer than 12 credit hours are considered part-time and will be charged the per-credit-hour, part-time tuition and fee rate.

Graduate Tuition

Graduate level enrollments are generally charged at a per credit hour tuition rate. This rate applies to all courses for which a graduate student registers, whether at the graduate or undergraduate level.

Some programs, particularly at Chicago-Kent College of Law and at Stuart School of Business, charge different rates depending on the program. Consult web.iit.edu/student-accounting for the official tuition rates.

No charge is assessed for seminars carrying zero credit hours. For review or other non-credit courses, tuition is computed by considering the number of class meetings per week as equivalent to the number of credit hours.

Graduate students registered for nine credit hours or more are considered full-time. Graduate students registered for less than nine credit hours are considered part-time.

Other Fees and Charges

A student may incur other fees and charges that are both mandatory and non-mandatory. For a complete current listing of all charges and fees, go to web.iit.edu/student-accounting. Books and supplies are available at the university bookstores. Costs for books and supplies can differ significantly depending upon the field of study. Students in the College of Architecture, for example, may spend less on books but substantially more on supplies.

Book Advance

The Student Accounting Office has partnered with the Illinois Institute of Technology Barnes & Noble bookstore to allow students with a student account credit balance to purchase books and supplies at the bookstore. This partnership provides students with a convenient way to purchase books prior to the start of classes using anticipated Title IV credits, eliminating the wait for a refund check. Students purchase books at either the university bookstore location or Barnes and Noble online and the charge is applied to the student account directly. Students who opt-in to this option need to complete the Title IV authorization form (p. 17).

Parking Fee

All students parking in campus parking lots must register their vehicle with Access, Card, and Parking Services and pay a parking fee at the beginning of the semester. For current fees, students should contact Access, Card, and Parking Services at iit.edu/acaps or 312.567.8968. Students authorized to park in university lots will receive a parking permit.

Student Health Insurance

All students who are registered for one billable hour are required to purchase the student health insurance policy or to submit proof of equivalent insurance before the end of the first week of classes. All students who are on an F-1 or J-1 visa and are registered for at least one class, participants in the co-op program, research or teaching assistants, or occupants of university residence halls are required to purchase the student health insurance. The premium for the insurance will be added to student tuition and fees as a charge. To avoid this charge, submit proof of comparable coverage online at iit.edu/shwc/insurance. F-1 and J-1 students may only waive the university's coverage with proof of employer provided insurance (see waiver). Students must submit their waiver each fall (or spring for spring start students). Other students, spouses, and dependents of students may participate in the student health program, if desired. Students should consult the Student Health and Wellness Center in IIT Tower, Suite 3D9-1, at 312.567.7550, or student.health@iit.edu, for further details.

E-Bills

Each semester, billing statements will be made available to students through the MyIIT portal (my.iit.edu) through the Manage My Account icon. Billing statements are also sent to other individuals or third parties that a student designates as an authorized user(s) and for whom the student has provided the university with an email address. This billing statement will detail the then-current charges, payments, and other credits to the student's account, including the amount the student must pay and the date such payment is due. Notifications of new billing statements will be sent via email to the student's university email address as well as the email for any other responsible party that the student had designated. Students agree to monitor their university email account regularly.

Payment of Tuition, Room and Board, and Other Fees and Charges

Tuition and fees, less any authorized financial aid awards, are considered a student's out-of-pocket responsibility. The due date for all out-of-pocket payments will be posted each semester at iit.edu/student-accounting. All out-of-pocket payments must be paid by the due date. Payment plan information can be found at web.iit.edu/student-accounting. The deadline to enroll in a plan will be posted each semester at web.iit.edu/student-accounting.

Please see web.iit.edu/student-accounting/payments/payment-plans **for options and instructions related to making payments.**

Payment Policy

Illinois Institute of Technology establishes an account for each of its students for the purpose of charging tuition and fees, room and board, and other applicable university charges. Students can access their account information directly online by logging into the MyIIT portal (my.iit.edu) and clicking on the Manage My Account icon located in the menu bar. Students may view their charges, due dates for these charges, payments, and credits from financial aid at any time.

Payment of all charges for a term is due on the first day of the term to which the charges apply. If students pay less than the total amount due by the respective due date, they will be assessed a monthly late payment fee of two percent on the remaining unpaid portion.

The Student Accounting Office will accept payment only up to the total amount of tuition and fees assessed to a student's account. Payments in excess of current charges will not be accepted.

The university does reserve the right to cancel registration depending on circumstances for non-payment. If a student has a past due balance remaining, in addition to the assessment of late payment fees, the student will have a hold placed on their records. This hold will prohibit a student from obtaining official transcripts and/or registering for future-term classes until the account balance is paid in full. To be able to register for the next term, students should pay their accounts in full. For more information about registration holds and late payments, please visit: web.iit.edu/student-accounting/payments/payment-policy/past-due-accounts.

Rejected Payments

If the university receives notification that a payment has been rejected for any reason, the returned amount will be charged to the student account along with a $50 fee. Payments rejected due to insufficient funds must be replaced with a cashier's check, money order, or credit card. Payments rejected due to invalid routing and/or account information or a closed account may be replaced with another electronic check from a different account. Following a second rejected payment, the university will no longer accept personal or electronic checks from the payee. All subsequent payments must be made by cashier's check, money order, or credit card.

Outstanding Debts/Late Fees/Financial Holds

Any outstanding balance due on a student's account that is not paid when due is subject to service charges in the amounts or at the rates established and published by the university from time to time. A restrictive hold is placed on a student's record when that student is delinquent in fulfilling their financial obligation to the university. A student will be considered delinquent when their account is not paid in full according to established university policies and by posted payment due dates. Students with outstanding university debt may be suspended from current term classes. Students will be prevented from registering for additional courses or obtaining official documents such as diplomas or transcripts until that outstanding balance has been paid in full. Students also acknowledge that failure to pay any amount due by the due date may result in an unfavorable report with credit bureaus and collection activities, including litigation.

Tuition Waiver Policy

Under exceptional circumstances such as withdrawal for involuntary military service, serious illness or injury, or action by the university, consideration may be given by the university for the issuing of a waiver for unused tuition upon written request to the academic department. Payments for charges other than tuition will remain the responsibility of the student. Students should consult iit.edu/registrar for the last day to add or drop a class without a penalty.

University Refund Policy

If a student's financial aid, including any disbursements of Title IV funds such as Pell grants or federal loans, creates a credit balance on their student account, they will be refunded any such overage. If any non-financial aid payments that are made results in an overpayment of the charges on a student's account, the university will hold these credits on the student account to be applied towards future charges, unless the student contacts the Student Accounting Office to request a refund of the overpayment, or ceases to be enrolled.

Students must be enrolled in direct deposit to receive their student refund. Refunds from financial aid credits are processed throughout the semester. Student Accounting will send an email whenever the office processes a refund, provided the student is enrolled in direct deposit. There is no fee for receiving a refund via direct deposit. For a full explanation of the university's policies and procedures related to refunding student account credit balances, refer to web.iit.edu/student-accounting.

Title IV Federal Loan Authorization

Health insurance fees, parking charges, and other items on a student bill **cannot** be automatically paid with Title IV Federal Loan funds. Students may authorize the university to pay these fees with Title IV Federal Loan funds by completing a Title IV Authorization form on the MyIIT portal and checking the "Pay Non-Institutional Charges" box. **Students who do not complete this Title IV Authorization may receive a refund and still owe the university money**.

Employer Tuition Deferment Plan

The Employer Tuition Deferment Plan allows students who are employed by a company that offers tuition reimbursement an opportunity to defer the reimbursable portion of their tuition until three weeks after grades are posted. By applying for the university's Tuition Employer Tuition Deferment Plan, students recognize that their employer's tuition reimbursement plan has qualifying conditions which they must meet in order to be reimbursed. Should a student's company refuse to pay this bill within the usual time frame for tuition deferment, the student will be personally responsible for this tuition and will be required to pay the bill in full. Students should also understand that a deferred payment fee of $55 will be due at the time of application, and it is non-refundable. If the tuition due under this agreement is not paid within three weeks following grades being posted, the student authorizes their employer to withhold the amount due from their pay and to pay that amount to Illinois Institute of Technology.

Students must understand that any amount not covered by the terms of their company's tuition reimbursement policy is due in full by the end of the add/drop registration period and is subject to fees and a hold preventing registration for the next term. If a student fails to meet the requirements to be eligible for the university's Employer Tuition Deferment Plan by the deadline, their tuition will not be deferred and will be due immediately.

Sponsor Billing (Third Party Invoicing)

Sponsor billing is the generation of an Illinois Institute of Technology (Illinois Tech) invoice to request payment of tuition/fees/housing for a student billed by the university to an external party or for the recovery of expenses incurred by the university on behalf of a student. Sponsors include outside parties, such as embassies, companies, and community agencies, who pay Illinois Institute of Technology directly for a student's educational expenses with funds that did not originate with the student.

Proof of Sponsorship Required

Students whose tuition and fees are paid by a sponsor must submit proof of sponsorship from their sponsoring agency. Adequate documentation must:

- Be written in English on the sponsor's official stationery
- Request the university to bill the sponsor for the student's charges
- Identify the student by full name (given name first followed by family name) and Campus-Wide ID if available
- Clearly state the type and percentage of charges the sponsor will pay
- Include a billing address
- Stipulate the exact begin and end dates of the period during which the sponsor will pay the student's charges (if the sponsor wishes to continue payment after the end date it must submit a new authorized letter)
- Contain no restrictions or contingencies (if, for example, the sponsor requires grades or transcripts prior to payment, the student must pay the original bill then seek reimbursement from the sponsoring organization)
- Be signed by an authorized official of the sponsoring organization

Processing/Altering Sponsorship Agreement

Invoices will be processed after the add/drop registration date of each semester. Any changes in eligibility for a sponsored student should be communicated to the Student Accounting Office immediately.

Students that become ineligible or have a reduction in their sponsored amount will owe this amount immediately. A restrictive hold will be placed on the account to prevent registration for subsequent terms, as well as prevent students from obtaining any official paperwork from the university.

Late Sponsorship Payment

In the event a sponsor fails to remit payment for a student, the sponsorship coverage is removed. The student is responsible for all outstanding balances on the account after the sponsorship is removed. If the student believes payment was inadvertently delinquent, it is the responsibility of the student to communicate with the sponsor to rectify this situation.

Students who fail to submit required sponsorship documentation to the Student Accounting Office in a timely manner will be held responsible for any outstanding balance on the student account, as well as penalty fees assessed to their accounts due to lack of payment.

Living Expenses

Unmarried Students

The university's residence halls provide facilities for room and board for undergraduate and graduate men and women. First-year students not living with their parents or guardians within a 20 mile radius of campus must live in the residence halls. Students who complete their housing contracts by July 1 are likely to receive their preferred room type. Residence hall contracts are made for the full academic year, from the first week of classes in August until the end of classes in May. Room and board charges are available on the Office of Residence Life website for students interested in submitting a room and board contract. For more information, please contact the Office of Residence Life at housing@iit.edu or visit the website at iit.edu/housing.

Meals

All undergraduate students living on campus are required to have a meal plan. First and second year students are assigned the unlimited meal plan. Upperclass students and graduate students are allowed to choose from a variety of meal plans. Meal plans are also available to non-residents. Learn more about dining options and available meal plans on the Dining website at web.iit.edu/housing/dining.

Married Students

Residence Life offers living accommodations for undergraduate and graduate students who are married, living with a domestic partner, or have a legal guardianship of a dependent. Married or family housing units are fully furnished with kitchens. All utilities as well as internet and cable are included in the price. Students applying for married or family housing must submit verification forms. For more information, please contact the Office of Residence Life at housing@iit.edu or visit the website at iit.edu/housing.

UNDERGRADUATE EDUCATION

Illinois Institute of Technology combines excellence in academic preparation for professional careers with opportunities for practical experience in the major branches of engineering, the sciences, mathematics, architecture, computer science, business, and liberal arts.

Undeclared Majors

Students who are unsure of their career choices may enter the university as undeclared majors. During the first year of study, undeclared majors take required university Core Curriculum courses in science, mathematics, computer science, humanities, and social sciences. These courses provide the foundation for nearly all of the university's major programs. Because Core Curriculum courses apply to all majors, most students may wait as late as their second year of study to declare their major and still graduate on time.

Undergraduate Degree Programs

Departments, Degrees, and Certificates

Co-Terminal Degree Programs

Co-terminal degrees allow outstanding Illinois Institute of Technology undergraduate students to simultaneously complete both an undergraduate and graduate degree (bachelor's degree and master's degree).

Co-terminal degrees provide an opportunity for students to gain greater knowledge in specialized areas while completing a smaller number of credit hours with increased scheduling flexibility than the completion of two degrees separately. Because most co-terminal degrees allow students to share course credit (a maximum of nine credit hours), students may complete both a bachelor's and master's degree in as few as five years. Up to a combined total of nine applicable credit hours earned prior to matriculation into an Illinois Institute of Technology graduate degree program, subject to the graduate studies rules and restrictions, may be considered for 1) external transfer credit for graduate transfer credit use; 2) internal transfer credit from an Illinois Institute of Technology undergraduate program; and/or 3) shared co-terminal program credit. More information regarding this policy is available in the Transfer Credit section of the Graduate Bulletin.

All co-terminal degree requirements must be completed within six years of undergraduate matriculation, or the student will be dismissed from the co-terminal degree program. A student who is placed on undergraduate academic probation may be dismissed from the co-terminal program pending review.

Co-terminal students maintain their undergraduate student status while completing graduate coursework, and can maintain financial aid eligibility when applicable.

The following are legacy co-terminal degree pairings as of June 2020. Students may also work with advisers to identify alternate bachelor's and master's degree pairings, pending the approval of the prospective graduate program and the student's undergraduate program. More information is available in the Co-Terminal Advising section of the Graduate Bulletin.

Applied Mathematics

Bachelor of Science in Applied Mathematics/Master of Science in Applied Mathematics
Bachelor of Science in Applied Mathematics/Master of Computer Science
Bachelor of Science in Applied Mathematics/Master of Science in Computer Science
Bachelor of Science in Applied Mathematics/Master of Data Science
Bachelor of Science in Applied Mathematics/Master of Mathematical Finance

Architecture

Bachelor of Architecture/Master of Science in Architecture
Bachelor of Architecture/Master of Engineering in Construction Engineering and Management

Biology

Bachelor of Science in Biochemistry/Master of Biology with Biochemistry specialization
Bachelor of Science in Biochemistry/Master of Science in Biology for the Health Professions
Bachelor of Science in Biochemistry/Master of Science in Biology with Biochemistry specialization
Bachelor of Science in Biochemistry/Master of Food Safety and Technology
Bachelor of Science in Biology/Master of Biology
Bachelor of Science in Biology/Master of Science in Biology
Bachelor of Science in Biology/Master of Science in Biology for the Health Professions
Bachelor of Science in Biology/Master of Computer Science
Bachelor of Science in Biology/Master of Science in Computer Science
Bachelor of Science in Biology/Master of Food Safety and Technology
Bachelor of Science in Molecular Biochemistry and Biophysics/Master of Science in Molecular Biochemistry and Biophysics

Biomedical Engineering

Bachelor of Science in Biomedical Engineering/Master of Biomedical Imaging and Signals
Bachelor of Science in Biomedical Engineering/Master of Chemical Engineering
Bachelor of Science in Biomedical Engineering/Master of Science in Biology for the Health Professions

Business Administration

Bachelor of Science in Business Administration/Master of Science in Finance
Bachelor of Science in Business Administration/Master of Science in Marketing Analytics
Bachelor of Science in Business Administration/Master of Public Administration

Chemical and Biological Engineering

Bachelor of Science in Chemical Engineering/Master of Biological Engineering
Bachelor of Science in Chemical Engineering/Master of Chemical Engineering
Bachelor of Science in Chemical Engineering/Master of Engineering in Environmental Engineering
Bachelor of Science in Chemical Engineering/Master of Food Process Engineering

Chemistry

Bachelor of Science in Chemistry/Master of Science in Biology for the Health Professions
Bachelor of Science in Chemistry/Master of Chemical Engineering
Bachelor of Science in Chemistry/Master of Food Safety and Technology
Bachelor of Science in Chemistry/Master of Science in Environmental Management and Sustainability

Civil, Architectural, and Environmental Engineering

Bachelor of Science in Architectural Engineering/Master of Engineering in Architectural Engineering
Bachelor of Science in Architectural Engineering/Master of Engineering in Construction Engineering and Management
Bachelor of Science in Architectural Engineering/Master of Engineering in Structural Engineering
Bachelor of Science in Civil Engineering/Master of Engineering in Construction Engineering and Management
Bachelor of Science in Civil Engineering/Master of Engineering in Environmental Engineering
Bachelor of Science in Civil Engineering/Master of Engineering in Geotechnical Engineering
Bachelor of Science in Civil Engineering/Master of Engineering in Structural Engineering
Bachelor of Science in Civil Engineering/Master of Engineering in Transportation Engineering
Bachelor of Science in Engineering Management/Master of Public Administration

Computer Science

Bachelor of Science in Computer Science/Master of Science in Applied Mathematics
Bachelor of Science in Computer Science/Master of Computer Science
Bachelor of Science in Computer Science/Master of Science in Computer Science
Bachelor of Science in Computer Science/Master of Data Science
Bachelor of Science in Computer Science/Master of Intellectual Property Management and Markets

Electrical and Computer Engineering

Bachelor of Science in Computer Engineering/Master of Science in Computer Engineering
Bachelor of Science in Computer Engineering/Master of Science in Electrical Engineering
Bachelor of Science in Computer Engineering/Master of Computer Science
Bachelor of Science in Computer Engineering/Master of Science in Computer Science
Bachelor of Science in Electrical Engineering/Master of Science in Computer Engineering
Bachelor of Science in Electrical Engineering/Master of Science in Electrical Engineering

Industrial Technology and Management

Bachelor of Industrial Technology and Management/Master of Industrial Technology and Operations

Information Technology and Management

Bachelor of Information Technology and Management/Master of Cyber Forensics and Security
Bachelor of Information Technology and Management/Master of Information Technology and Management

Mechanical, Materials, and Aerospace Engineering

Bachelor of Science in Aerospace Engineering/Master of Engineering in Materials Science and Engineering
Bachelor of Science in Aerospace Engineering/Master of Engineering in Mechanical and Aerospace Engineering
Bachelor of Science in Materials Science and Engineering/Master of Engineering in Materials Science and Engineering
Bachelor of Science in Mechanical Engineering/Master of Engineering in Materials Science and Engineering
Bachelor of Science in Mechanical Engineering/Master of Engineering in Mechanical and Aerospace Engineering

Physics

Bachelor of Science in Physics/Master of Computer Science
Bachelor of Science in Physics/Master of Science in Computer Science
Bachelor of Science in Physics/Master of Health Physics
Bachelor of Science in Physics/Master of Science in Physics

Social Sciences

Bachelor of Science in Social and Economic Development Policy/Master of Public Administration

Core Curriculum

The Core Curriculum is designed to ensure that all Illinois Institute of Technology graduates have a basic understanding of certain essential areas of knowledge. The Core Curriculum sets minimal requirements. Most degree programs require additional courses in these areas. These additional course requirements are found in the departmental listings. Core Curriculum requirements will not be waived. Substitutions may be considered upon written request to the Office of Undergraduate Academic Affairs. Approval will be granted on an individualized basis and then, only under extraordinary circumstances.

A. Writing and Communication
   Illinois Institute of Technology recognizes the importance of critical thinking, writing, and oral communication in all academic pursuits and in professional practice. Illinois Institute of Technology is committed to a campus-wide program that engages students in the practice of written and oral communication in all disciplines. This program includes the following components:
   1. Basic Writing Proficiency (BWP). Incoming degree-seeking (not visiting or exchange) students are expected to have a basic level of writing skills, which Illinois Institute of Technology refers to as the BWP requirement. There are several ways for incoming students to demonstrate that they have met this requirement:
      a. They can take an appropriate optional section of the ACT or SAT exam and pass it. Passing levels are:
         - 8 or higher on ACT Writing
         - 600 or higher on SAT Writing
         - 9 or higher on SAT Essay
         - 33 or higher on new SAT Writing and Language
      b. They may present transfer or AP credit (4 or higher on the English Language exam) for COM 101 Writing in the University.
      c. If the BWP is not satisfied by either of these two methods, students must take the Illinois Tech Basic Writing Proficiency Examination before starting classes in their first semester. Passing the exam equals passing the BWP requirement.
      d. Students who do not pass the BWP via the above methods must take and pass an approved composition course (Illinois Tech offers COM 101 each regular semester) within their first academic year at the university.
      e. Students who do not pass their Basic Writing Proficiency requirement in their first academic year are highly unlikely to be able to graduate on schedule. This is because passing the BWP is a prerequisite for enrolling in a required Humanities 200-level course, and passing a Humanities 200-level course is a prerequisite for enrolling in required 300- and 400-level Humanities and Social Sciences courses.
   2. Students must take and pass a writing instruction intensive 200-level Humanities course (see below), or present transfer or AP credit for such a course.
   3. Students must complete a minimum of 36 credit hours of courses with a significant written and oral communication component, identified with a **(C)** in this bulletin, with a minimum distribution as follows:
      a. 12 credit hours in major courses.
      b. 12 credit hours in non-major courses.
      c. Full-time students should enroll in two **(C)**-designated courses, and part-time students should enroll in one **(C)**-designated course each academic year.
   4. Students must contact the Illinois Tech Writing Center when referred by course instructors or academic advisers.

B. Humanities 200-Level Course
   All students must complete one of the following courses:

HUM 200	Topics in Humanities	3
HUM 202	Industrial Culture	3
HUM 204	Age of Darwin	3
HUM 206	Life Stories	3
HUM 208	Digital Culture	3
or any other HUM 200-level elective		3

C. Human Sciences Module
   All students must complete 18 credit hours subject to the following distribution requirements:
   1. At least two Humanities courses (**(H)** designation) at the 300-level or above. Students may use foreign language courses at the intermediate and advanced level to fulfill 300-level requirements.
   2. At least three Social or Behavioral Sciences courses. These courses are marked with an **(S)** in this bulletin. The courses must be distributed as follows:
      a. At least two courses at the 300-level or above.
      b. Courses from at least two different fields.
      c. At least six credit hours in a single field.

d. Courses required by and/or applied toward the major or entailed minor requirements of a degree program cannot be used to satisfy the Human Sciences Module of the Core Curriculum except where specifically allowed in certain programs.[1]

D. STEM Module
A minimum 16 credit hours is required between Mathematics and Natural Science or Engineering.

1. Mathematics: five to six credit hours
   The courses must be at the level of MATH 119 or above. BUS 221 and PSYC 203 also satisfy this requirement.
2. Natural Science or Engineering: 10-11 credit hours
   This component may be satisfied by courses in engineering, biology, chemistry, physics, or courses in architecture, food safety and technology, and psychology marked with an **(N)**. These courses must be distributed as follows:
   a. Two sequential natural science or engineering courses in a single field. (CHEM 124 with MS 201 satisfies this requirement.)
   b. At least one natural science or engineering course in a second field.
3. Computer Science: two credit hours
   All students must complete one of the following courses:

CS 104	Introduction to Computer Programming for Engineers	2
CS 105	Introduction to Computer Programming	2
CS 110	Computing Principles	2
CS 115	Object-Oriented Programming I	2
CS 116	Object-Oriented Programming II	2
CS 201	Accelerated Introduction to Computer Science	4
ARCH 107	Design Communications I: Units and Order	3
ITM 311	Introduction to Software Development	3
or a computer science course at the 300-level or above		3

E. Collaborative Interdisciplinary and/or Professional Experience
All students must take eight credit hours as follows:

1. Introduction to the Profession (ITP): two credit hours
   In most departments, students must complete this requirement in their first year.[2] Students entering with 30 credit hours or more of transfer credit may have this requirement waived with department approval. If waived, the total credit hours required for the degree still must be satisfied.
2. Interprofessional Projects (IPRO): six credit hours
   Students will participate in at least two Interprofessional Project experiences. These projects develop communication, teamwork, and leadership skills, as well as an awareness of economic, marketing, ethical, and social issues within the framework of a multidisciplinary team project. The project teams will be integrated across academic programs and at different levels within programs. Students who complete an ROTC minor are exempt from one of the two IPRO requirements.

Students may apply coursework from the Core Curriculum's Human Sciences and/or STEM modules toward the non-core requirements of any standing minor, second major, or the second degree of a dual-degree program. This allowance does not override the distribution requirements of either core module for a student's first major or first degree program.

[1] Undergraduate academic degree programs, including minors which may be required by degree programs, may not mandate, specify, or otherwise limit the Human Sciences Module Core Curriculum coursework. Programs may request exceptions from this policy by submitting a curriculum change proposal to the Undergraduate Studies Committee. In establishing exceptions, consideration shall be given to program viability balanced against the integrity of the Core Curriculum.

[2] Departments may offer ITP classes in later years per review and approval by the Undergraduate Studies Committee (UGSC).

Minors

A minor consists of at least five courses (minimum of 15 credit hours) not required for a degree program. Since a minor provides a coherent set of ideas, concepts, and educational experiences in a variety of areas, students may find that a minor will enhance potential for professional development. Students who choose a minor are encouraged to consult with the minor adviser. Students who take the standard core curriculum's distribution of courses may apply them toward the requirements of any approved minor.

Note: Not all minors are applicable to all majors.

1 Available only to materials science engineering or mechanical engineering majors.

2 Available only to aerospace engineering or materials science engineering majors.

3 Not available to architecture majors.

4 Not available to computer engineering, electrical engineering, or biomedical engineering (neural engineering track) majors.

5 Available only to aerospace engineering or mechanical engineering majors.

[6] Not available to materials science majors.
[7] Not available to CAEE majors.

Special Programs

Dual Undergraduate Degree Options

Depending upon interest, capabilities, and goals, and with the permission of their advisers and department chairs, students may choose dual undergraduate degree programs or select one of the options listed below.

Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science

Students interested in this program should consult a Department of Biology or Department of Psychology adviser.

Bachelor of Science in Biology/Bachelor of Science in Psychological Science

Students interested in this program should consult a Department of Biology or Department of Psychology adviser.

Bachelor of Science in Computer Engineering/Bachelor of Science in Computer Science

Students interested in this program should consult a Department of Computer Science adviser. First-year students entering the university with a significant number of Advanced Placement credits might be able to complete both degrees in four years.

Bachelor of Science in Computer Engineering/Bachelor of Science in Electrical Engineering

Students interested in this program should consult a Department of Electrical and Computer Engineering adviser. First-year students entering the university with a significant number of Advanced Placement credits may be able to complete both degrees in four years.

Bachelor of Science in Mechanical Engineering (ME)/Bachelor of Science in Aerospace Engineering (AE)/ Bachelor of Science in Materials Science and Engineering (MSE)

A dual major in ME and AE, ME and MSE, or AE and MSE may generally be completed in one additional year. Interested students should consult their adviser.

Co-Terminal Degrees (Bachelor’s Degree and Master’s Degree)

Co-terminal degrees allow outstanding undergraduate students to simultaneously complete both an undergraduate and graduate degree (bachelor’s degree and master’s degree).

Co-terminal degrees provide an opportunity for students to gain greater knowledge in specialized areas while completing a smaller number of credit hours with increased scheduling flexibility than the completion of two degrees separately. Because most co-terminal degrees allow students to share course credit (a maximum of nine credit hours), students may complete both a bachelor’s and master’s degree in as few as five years. Up to a combined total of nine applicable credit hours earned prior to matriculation into an Illinois Institute of Technology graduate degree program, subject to the graduate studies rules and restrictions, may be considered for 1) external transfer credit for graduate transfer credit use; 2) internal transfer credit from an Illinois Institute of Technology undergraduate program; and/or 3) shared co-terminal program credit. More information regarding this policy is available in the Transfer Credit section of the Graduate Bulletin.

Students applying to co-terminal studies must have completed at least 60 credit hours of undergraduate study and at least one full semester at the university. Students must be at least one semester away from undergraduate graduation in order to apply. Applicants are encouraged to have a GPA of at least 3.0/4.0; however, please consult individual departments for their specific GPA requirements. Questions regarding co-terminal admission should be addressed to the Office of Graduate Admission at grad.admission@iit.edu.

Co-terminal students maintain their undergraduate student status while completing graduate coursework, and can maintain financial aid eligibility when applicable.

Co-terminal degrees are awarded simultaneously, and students may not receive their first degree before the requirements of the second degree are satisfied. In such cases, the conferral of the first degree will be held until the completion of the second degree.

Co-terminal degrees can be formal degree pairings, or students may choose to work with advisers to identify alternate bachelor’s and master’s degree pairings, pending the approval of the prospective graduate program and the student’s undergraduate program. For more information on the university's legacy co-terminal degree pairings, please see the Co-Terminal Degree Programs section (p. 22) of this bulletin.

General questions regarding co-terminal degrees may be addressed to cotermdegrees@iit.edu.

Bachelor's/Master's Degree Options

The university's double-degree options allow students to earn two degrees in as few as five years. The university has created bachelor's degree/master's degree options in fields in demand in professions where graduate training is essential.

Students may enter some undergraduate/graduate double-degree programs either through the honors track or the standard track. Through the honors track, exceptional students may be admitted simultaneously into both the undergraduate and graduate schools when they apply to the university. Admission will be based on their high school records, including grades, test scores, faculty/employer recommendation, and other documentation. Through the standard track, students are admitted into the undergraduate department offering the bachelor's portion of the program.

Depending upon their interests, capabilities, and goals, and with the permission of their advisers and department chairs, students may choose combined degree programs or select one of the following options.

Bachelor of Architecture (B.Arch.)/Master of Business Administration (M.B.A.)

Architects recognize the importance of business skills in their profession. Recognizing the 21st century's concerns with environmental management and sustainable design issues, Illinois Institute of Technology offers young architects a unique opportunity for advanced graduate study in the Stuart School of Business.

Students completing the requirements for the B.Arch. degree may also earn the M.B.A. degree by completing an approved set of courses established by their academic advisers and appropriate deans in the College of Architecture and the Stuart School of Business. Thus, qualified architecture students may earn their B.Arch. and the M.B.A. in approximately six-and-a-half years, rather than the usual seven years. When including a summer term, the M.B.A. will typically require an additional one-and-a-half years of study.

Students considering the B.Arch./M.B.A. dual degree program should consult with undergraduate advisers in both programs early in their academic career.

Students will be required to apply for admission to the graduate M.B.A. program, providing Graduate Management Admission Test (GMAT) scores and all other necessary application materials. The application should be completed prior to the end of the seventh semester of the B.Arch. program. Upon admission, B.Arch. students could successfully complete up to four M.B.A. courses, or 12 credit hours, before joining the program on a full-time basis. These courses are typically basic core courses for which there are no prerequisites. The Stuart School M.B.A. advisers would be able to identify these courses and offer appropriate advice to the B.Arch. students upon their admission to the program.

Bachelor of Architecture/Master of Engineering in Civil Engineering

Qualified students enrolled at the university may earn both the Bachelor of Architecture and one of two professional Master of Engineering degrees in Civil Engineering. Students who seek the Master of Engineering in Structural Engineering degree (ME STE) must successfully complete the following courses as part of their undergraduate program in architecture before starting a master's program:

MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate and Vector Calculus	4
MATH 252	Introduction to Differential Equations	4
PHYS 123	General Physics I: Mechanics	4
CAE 286	Theory and Concept of Structural Mechanics	3
CAE 287	Mechanics of Structural Materials	3
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 307	Structural Design II	3
CAE 431	Steel Design	3
CAE 432	Concrete and Foundation Design	3

Students who seek the Master of Engineering in Architectural Engineering should take:

CAE 208	Thermal-Fluids Engineering I	3
CAE 209	Thermal-Fluids Engineering II	3
CAE 383	Electrical and Electronic Circuits	3

Students who seek the Master of Engineering in Construction Engineering and Management (ME CM) should consult the department.

Students who anticipate entering into the program should seek advising in the Department of Civil, Architectural, and Environmental Engineering and the College of Architecture early in their studies.

Bachelor of Science/Master of Public Administration

Qualified students who are interested in careers in the public sector may complete their bachelor's degree and Master of Public Administration (M.P.A.) in five or fewer years. Students interested in this option should submit their request to the M.P.A. program after their fourth semester. Qualified students are granted provisional admission to the program and begin taking the graduate level M.P.A. courses, usually at the rate of one per semester. When the student has substantially completed all the requirements for the bachelor's degree portion of the program, the student applies for regular admission to the graduate program. The decision about regular admission will be based on the work the student has completed at the time of the request for regular admission. By then, the student will have completed the M.P.A. foundation courses. Students in this program receive credit toward their bachelor's degree electives for two M.P.A. courses and with the approval of the academic director, may receive credit toward their M.P.A. degree for up to six credit hours of relevant undergraduate coursework.

Combined Undergraduate/Graduate Law Program (Leading to B.S./J.D. Degrees)

Students in this program study their undergraduate program at the university's Mies Campus and the law school portion of the program at Chicago-Kent College of Law.

Pre-law undergraduate students also have access to pre-law advising and assistance preparing for the LSAT.

Honors Law Program

The Honors Law Program allows students to pursue an accelerated sequence of coursework leading to the Bachelor of Science (B.S.) and Juris Doctor (J.D.) degrees. Students may apply to the Honors Law Program prior to beginning their first year. Applications are also accepted from students in their first or second year, including transfer students. Students who major in biology, chemistry, communication, computer information systems, digital humanities, humanities, physics, or psychological science pursue an accelerated, focused course of study and normally complete both the B.S. degree and the J.D. degree in six years instead of the usual seven years. Students in other majors may also be able to accelerate completion of both degrees.

Acceptance by Chicago-Kent is automatic for those students who meet the minimum program requirements, which are:

- Maintain a 3.25 cumulative undergraduate GPA.
- Take the Law School Admissions Test (LSAT) by February of their third undergraduate year at the university if they are in the six-year program or by February of their fourth year at the university if they are not and achieve an LSAT score at or exceeding the median score for the Chicago-Kent entering class.
- Submit a completed application to Chicago-Kent by April 15 of the third undergraduate year if they are in the six-year program or in the fourth undergraduate year if they are not.

Students who participate in the program but who do not meet the criteria for guaranteed admission are invited to apply through the regular competitive application process for admission to Chicago-Kent after three or four years of undergraduate study. In reviewing such applications, consideration will be given to the student's participation in the Honors Law Program.

Premedical Programs

www.iit.edu/premed

Illinois Institute of Technology provides excellent preparation for students planning to attend medical or other health-related professional schools. Students majoring in various fields, listed below, earn a Bachelor of Science degree and, at the same time, fulfill the prerequisites for medical school:

- Science (biology, chemistry, molecular biochemistry and biophysics, physics) with a minor in Premedical Studies. Many science majors will complete most of the courses required for the premedical curriculum as part of their major requirements. These students will not qualify for a Premedical Studies minor.
- Engineering (biomedical, chemical, electrical, materials science, mechanical) and computer science with a minor in Premedical Studies
- Human science and other majors with minor in Premedical Studies

Rapidly advancing technology is changing the practice of medicine. Physicians who have a strong technical background will be among the best prepared to utilize the new technology. The university's curricula emphasize technical proficiency as well as communication and teamwork, which help students develop the interpersonal skills that are critical in the health professions.

Students interested in pursuing careers in medicine, pharmacy, dentistry, osteopathy, optometry, and veterinary science should contact the Premedical Office for further information.

Each student works with a departmental premedical adviser to structure a course of study to meet medical school requirements and to prepare for the Medical College Admission Test (MCAT) in the junior year.

The following is a list of Illinois Tech science courses that fulfill the premedical requirements of most medical schools:

BIOL 107	General Biology Lectures	3
BIOL 109	General Biology Laboratory	1
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 124	Principles of Chemistry I with Laboratory	4
CHEM 125	Principles of Chemistry II with Laboratory	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Laboratory	2
PHYS 123	General Physics I: Mechanics	4
PHYS 221	General Physics II: Electricity and Magnetism	4

For a competitive application, and to improve performance during the first year in medical school, or to prepare for the MCAT, the following courses are recommended:

BIOL 214	Genetics	3
BIOL 403	Biochemistry	4
BIOL 430	Human Physiology	3
BIOL 445	Cell Biology	3
MATH 425	Statistical Methods	3
PHYS 224	General Physics III for Engineers	3
PSYC 221	Introduction to Psychological Science	3
SOC 200	Introduction to Sociology	3

The Premedical Advisory Committee members monitor academic progress, gather information about volunteer and research opportunities, guide the student through the medical school application process, advise in choosing a medical school and in preparation of the AMCAS application, collect and prepare recommendation letters, and assist in preparation for interviews with medical school admission committees.

Premedical Advisory Committee
Kathryn Spink (Chair) (BIOL)
Somdev Banerjee (CHEM)
Nick Menhart (BIOL)
Jennifer Miller (PSYC)
David Mogul (BME)

Contact
Kathryn Spink
Director of Pre-Health Professions Programs
Senior Lecturer of Biology
146C Robert A. Pritzker Science Center
spink@iit.edu
312.567.3441

Preparatory Program for Medical Studies (Post-Baccalaureate Premed)

The purpose of the Preparatory Program for Medical Studies is to meet the needs of college graduates who have decided to pursue a medical education but who lack some or all of the basic science courses required for admission to medical school. The objective of the program is to provide rigorous education in all areas of the premedical sciences that are required for admission to any medical, osteopathic, or veterinary school in the country.

Coursework

Students sufficiently prepared in mathematics and English who enter the program in the fall semester can expect to complete the program in two years. The third year is known as the “glide year.” This is the year between completing the program and entering medical school. For most students, the glide year provides the opportunity to take additional courses or to deepen their exposure to medicine through full-time employment in a clinical setting or in a medical research laboratory. In order to be eligible for admission to medical school and subsequently, to be licensed to practice medicine, students must complete the following seven courses in the arts and sciences:

- One year of college English, including a significant amount of expository writing
- One year of college mathematics, including statistics
- One year of general physics, including laboratory
- One year of general chemistry, including laboratory
- One year of organic chemistry, including laboratory
- One year of biology, including laboratory, with significant emphasis on molecular and cellular biology
- One year of upper-level coursework in biological sciences, including biochemistry

Advising and Support

On the Mies Campus of Illinois Institute of Technology, there are a number of advisers who together constitute the Premedical Advisory Committee (science.iit.edu/pre-medicine). Preparatory Program students will be assigned an adviser who will be available to counsel them as they plan their program of study and as they prepare their applications to medical school. A number of academic support services will be made available to students in the Preparatory Program. In the university's Academic Resource Center, students can meet with tutors at no expense for additional help in their premedical courses. In the Premedical Office, support staff will collect and send letters of recommendation to medical schools. Each year the Premedical Office and the AMSA-IIT host a number of events specifically for premedical students including special seminars of medical interest and forums in which current students can learn from experiences of those who have already taken the MCAT or been admitted to medical school. Preparatory Program students are invited and encouraged to attend weekly colloquia in the biological and chemical sciences and in other departments offering seminars of medical interest. Finally, the university's location in the city of Chicago is a special advantage to students in the Preparatory Program. The city is home to six medical schools and numerous hospitals and medical research centers. It is also home to the American Medical Association. This concentration of medical practice will provide Preparatory Program students with a wide variety of opportunities to gain experience in both clinical settings and in medical research through volunteer service and paid employment.

Academic Standards

Medical schools expect successful applicants to possess excellent grounding in the premedical sciences. The quality of a student's preparation is measured by the grades earned in premedical courses. For this reason, Preparatory Program students will be held to high academic standards. At a minimum, students must maintain a cumulative GPA of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant's character. Students in the Preparatory Program are expected to conduct themselves with honesty and integrity, inspiring confidence in their abilities to assume the responsibilities of medical practice. Students in the Preparatory Program are subject to the academic and disciplinary standards detailed in the Illinois Institute of Technology Student Handbook.

Admissions Eligibility

The student must hold the degree of Bachelor of Arts or Science from an accredited college or university in the United States or an equivalent degree from an institution outside the United States. At a minimum, successful applicants must possess a cumulative undergraduate GPA of 3.00. In most cases, students will not be eligible for admission if they have applied to medical school previously or have completed their premedical preparation elsewhere within the last five years. This is not a remedial program. Students must submit a complete application package to the Office of Undergraduate Admission for full consideration.

B.S./D.O./O.D. Programs

In addition to Premedical Studies, the university offers three dual-degree programs. Students earn a bachelor's degree from Illinois Institute of Technology and a medical degree from the medical or optometry school. These innovative programs are designed to meet the urgent and intensifying need for technologically proficient physicians and researchers. More information can be obtained from the Office of Undergraduate Admission at 312.567.3025 or admission@iit.edu.

Illinois Tech/Midwestern University Chicago College of Osteopathic Medicine Dual Admission Program (4+4)

The Illinois Tech/Midwestern B.S./D.O. Program is an eight-year program open to freshmen applicants in which students complete their Bachelor of Science degree at the university in a major of their choosing. Students must complete a standard curriculum of Premedical Studies either as part of their major or as a Premedical Studies minor, maintain high academic standards, and obtain a satisfactory score on the MCAT. The final four years are spent at Midwestern University-Chicago College of Osteopathic Medicine, during which the student earns the Doctor of Osteopathic Medicine (D.O.) degree.

Illinois Tech/Illinois College of Optometry B.S./O.D. Early Admission Program (3+4)

The Illinois Tech/ICO Program is an early admission program open to sophomores. Students admitted to the program complete three years at the university taking courses leading to a Bachelor of Science degree in Biology and four years at Illinois College of Optometry (ICO). Illinois Tech students are only guaranteed an interview with ICO after they have successfully completed the required biology curriculum outlined by ICO. Courses taken during the first year at ICO also count as senior-year-level biology courses. Students receive the Bachelor of Science in Biology degree from the university after completing the first year at ICO and receive the Doctor of Optometry (O.D.) degree after completing all requirements at ICO. Students must maintain high academic standards and perform satisfactorily on the OPT (Optometry Admissions Test).

Pre-Pharmacy Program

Illinois Institute of Technology and Midwestern University have a Dual Acceptance Program for Midwestern's Chicago College of Pharmacy (CCP). To be eligible for this program, students must meet Illinois Tech's admission requirements and also be selected for admission by the CCP Admissions Committee. Successful applicants will be ensured a seat at CCP upon successful completion of the pre-pharmacy requirements within two years at Illinois Tech; maintain a minimum cumulative pre-pharmacy GPA of 3.20; and earn a grade of "C" or higher in all required courses. The Pharmacy College Admissions Test (PCAT) is waived for students who successfully complete the pre-pharmacy program at Illinois Tech and who are admitted to CCP in the Dual Acceptance Program.

For further information see www.midwestern.edu.

Certificate Programs

Undergraduate Certificate Programs

The Department of Civil, Architectural, and Environmental Engineering offers a certificate program in Engineering Graphics and CAD. This program is designed to prepare specialists in graphics for positions in business and industry. Students completing the specified courses with satisfactory grades will be awarded a certificate of completion. This certificate is only available to students enrolled in a degree program at the university and does not qualify for federal financial aid. Consult the Civil, Architectural, and Environmental Engineering section (p. 61) in this bulletin for further information.

The Industrial Technology and Management program offers the Industrial Technology and Management (INTM) certificate for individuals who want to improve management, supervisory, and decision-making skills required for world-class industrial operations. This certificate does not qualify for federal financial aid. Consult the Industrial Technology and Management section in this bulletin for further information.

The Department of Psychology offers a certificate in Industrial Training. This certificate is designed to help individuals learn methods of knowledge delivery in industrial training settings. This certificate is only available to students enrolled in a degree program at the university and does not qualify for federal financial aid. Consult the Department of Psychology section in this bulletin for further information.

Post-Baccalaureate Certificate Programs

Departments that offer post-baccalaureate certificate programs are: Chemical and Biological Engineering; Chemistry; Civil, Architectural, and Environmental Engineering; Computer Science; Electrical and Computer Engineering; Food Science and Nutrition; Humanities; Information Technology and Management; Mechanical, Materials, and Aerospace Engineering; Physics; and Psychology. Certificate programs are also offered by the Stuart School of Business.

For a complete list of graduate certificate programs; consult the current Graduate Bulletin or admissions.iit.edu/graduate/programs.

Gainful Employment Information

As of July 1, 2011, institutions were required to disclose the following information about each of the institution's certificate programs that lead to gainful employment: the name of the certificate program, the Classification of Instructional Programs Code (CIP) and the Standard Occupation Code (SOC), tuition and fee charges, the typical cost of books and supplies, and the average cost of room and board. As of July 1, 2017, disclosures were made available online for each program on the individual program page.

Per Gainful Employment guidelines, if the number of students who completed a Gainful Employment program during the award year was less than ten, the school cannot disclose median loan debt and on-time completion rate for privacy reasons. Additionally, Illinois Institute of Technology's accreditor does not require the calculation of job placement rates and therefore the university was unable to disclose such rates.

As of July 2019, schools are no longer required to disclose these details starting in July 2020. Thus, the above information is for reference. Gainful Employment regulations may change after the date of this publication. The most current information related to Gainful Employment Programs may be found on the Graduate Admission website at admissions.iit.edu/graduate.

Study Abroad

The university encourages students of all majors to study abroad during part of their undergraduate careers. Studying abroad enriches the college experience by providing a different intellectual and cultural environment and enriches the academic program by giving breadth to the major discipline.

Students wishing to study abroad should contact the Study Abroad Office in the International Center for information and advising. The application process should begin approximately one year before study abroad is anticipated, with the application deadline falling one semester prior to study abroad. Only students whose applications are approved by the Study Abroad Committee are permitted to participate in study abroad. Students maintain full-time student status at the university for the duration the study abroad program. Upon approval from the Study Abroad Office, students must meet with their academic adviser and the Office of Undergraduate Academic Affairs to approve a plan of study.

Further information is available on the Study Abroad website (web.iit.edu/study-abroad).

Exchange Programs

Exchange programs work on the principle of a one-for-one exchange of students, with a balance of students being maintained on a rolling basis. A student pays Illinois Institute of Technology tuition for the term abroad and takes courses at a foreign institution alongside students from the host country. Additional expenses not paid to the university include airfare, housing, meals, books and supplies, and independent travel. Students earn Illinois Tech transfer credit with a passing grade.

Exchange programs are available for most majors, though some may be restricted to a specific department or school. Proficiency in the host language may be required, though many universities offer instruction in English. Consult the individual program pages on the Study Abroad website for more information.

Illinois Institute of Technology has undergraduate exchange programs with the following universities:

- Argentina: Universidad Torcuato Di Tella
- Australia: Queensland University of Technology (QUT)
- Denmark: Technical University of Denmark (DTU)
- France: Institut National des Sciences Appliques de Lyon (INSA Lyon)
- Germany: Hochschule Pforzheim (Pforzheim University)
- Ireland: University College Cork (UCC)
- Italy: Universit Iuav di Venezia (IUAV)
- Mexico: Tecnolgico de Monterrey (ITESM)
- Singapore: Singapore Management University (SMU)
- Spain: Universitat Politecnica de Catalunya, Escola Tecnica Superior d'Arquitectura de Barcelona (UPC ETSAB)
- Spain: Universidad Pontifica Comillas
- Sweden: KTH Royal Institute of Technology
- Switzerland: Zurich University of Applied Sciences (ZHAW)
- United Kingdom: University of Birmingham

Illinois Institute of Technology is a member of the Global Engineering Education Exchange (GE3), allowing engineering and computer science majors to study abroad under the one-for-one exchange model at one of 30 other institutions in addition to those listed above.

Partner University Visiting Programs

Illinois Institute of Technology has direct visiting student agreements with more than 30 partner universities around the world. A student takes courses at a foreign institution alongside students from the host country. Students earn Illinois Tech transfer credit with a passing grade. However, no tuition is paid to the university for the term abroad, though a student may pay certain fees, such as a health insurance fee. Tuition, fees, and housing are typically paid to the host partner university, and students must also budget for airfare, meals, books and supplies, and independent travel.

Proficiency in the host language may be required, though many universities offer instruction in English. Consult the individual program pages on the Study Abroad website for more information.

Faculty-led Study Abroad Programs

The university offers summer and semester study abroad programs taught by Illinois Tech faculty. Opportunities vary from year to year, and programs are posted on the Study Abroad website and are publicized by the academic departments. Recent faculty-led programs have included architecture studios in Germany, Ghana, and Italy.

A student registers for an Illinois Tech course, pays Illinois Tech tuition for the term abroad and pays a program fee which typically includes housing and group travel. Additional expenses not paid to the university typically include airfare, meals, books and supplies, and independent travel.

External or Third Party Provider Programs

Another option for students is to participate in a study abroad program organized by a third party provider. Programs of providers who participate in Study Abroad fairs on campus are included in the search engine on the Study Abroad website as external/provider programs. Students may find other programs through their own research. Although these programs are not affiliated with the university, a student may be approved for participation in these programs by following the procedures outlined by the Study Abroad Office.

Students earn Illinois Tech transfer credit with a passing grade. No tuition is paid to Illinois Tech for the term abroad, though a student may pay certain fees, such as a health insurance fee. These programs vary considerably in terms of program structure and what is included in the program fee. It is the student's responsibility to determine program costs and application requirements and to follow the procedures outlined by the university as well as the provider.

Joint Programs

Illinois Institute of Technology has established joint program agreements with the following Chicago-area institutions: Benedictine University, DePaul University, Dominican University, Elmhurst College, Lewis University, and Wheaton College. These programs differ from a 3+2 transfer program in that students earn two degrees: a bachelor's degree in an engineering discipline from Illinois Tech and a bachelor's degree in an approved discipline from their host school.

Students will live on the campus of their host school while completing the requirements for both degrees.

Admission into the joint program at another institution does not guarantee admission to Illinois Institute of Technology. For additional information, students should visit the Office of Undergraduate Admission website (admission.iit.edu). Sample curricula for the joint programs are available at the Undergraduate Academic Affairs website (iit.edu/ugaa).

Dual Admission Programs

Illinois Institute of Technology has established dual admission programs with College of DuPage and Joliet Junior College. These 2+2 programs allow students to complete an associate's degree and a bachelor's degree in four years of study with transfer credit. The bachelor's degree program areas include information technology and management (ITM) and psychology. For more information, see the Department of Information Technology and Management or Department of Psychology sections of this bulletin, or contact the Office of Undergraduate Admission (admission.iit.edu).

Reserve Officers Training Corps (ROTC)

ROTC programs are available as minors in the regular university degree programs. These programs enable men and women to become commissioned officers in the U.S. Air Force, Army, Marine Corps, or Navy upon graduation with a bachelor's degree. ROTC/Illinois Tech combined scholarships in many cases allow winners to attend the university free of charge. Contact the Office of Undergraduate Admission (admission.iit.edu) or any of the university's ROTC departments for scholarship/program information.

VanderCook College of Music

Full-time students in good standing may take courses offered at VanderCook College of Music. The following VanderCook courses may be used as humanities electives in all university degree programs: HIST 202, HIST 203, HIST 204, and HUM 301. A maximum of nine credit hours of performance courses may be used as free electives. Please contact the Office of Undergraduate Academic Affairs (web.iit.edu/ugaa) for further information.

Admission to VanderCook courses is on a space-available basis and students may be asked to audition or to satisfy other requirements prior to acceptance into a VanderCook course. Approval by the Student Accounting office is also required since there is a fee for taking a course at VanderCook.

Minor in Music

In collaboration with VanderCook College of Music, Illinois Tech also offers a minor in music. This minor consists of 15 semester hours in music, including a minimum of six credit hours of classroom-based history or theory courses, and a maximum of nine credit hours of performance coursework. Students should contact the Office of Undergraduate Academic Affairs regarding applicability of courses toward a degree program.

English Language Services

The mission of English Language Services at Illinois Institute of Technology is to provide engaging English language instruction in a dynamic learning environment relevant to the academic and professional needs of non-native learners.

English Language Services offers several options for students to develop their language abilities. To view more information about the English Language Services department and what they offer, please visit english.iit.edu. English Language Services is accredited by CEA (the Commission on English Language Program Accreditation), and under the university through the Higher Learning Commission (HLC), and is licensed to operate under the Illinois Board of Higher Education.

To view information about specific programs and courses, please visit the Language Courses section of this bulletin. Programs include:

- Intensive English and Pathway Program
- English Language Program (commonly referred to as PESL)
- Professional Communication Advancement
- English for Design

English Language Services also offers special programs/courses for visiting groups as well as individuals who want to study part-time. Contact us at els@iit.edu to find out more.

Supplemental English Language Courses

English language courses are not for academic credit and may be required as a condition of admission. English Language Services offers the following programs:

- English Language Program (ELP) (p. 35)
- Intensive English Program (IEP) (p. 36)

English Language Program

English Language Program courses, commonly referred to as PESL, are supplemental English language courses for undergraduate and graduate students. They provide a linguistic bridge for currently admitted international students who need improvement with the English language. Illinois Institute of Technology offers skill-building courses in academic reading, listening, writing, and oral communication that develop linguistic as well as cultural competence. Courses in the English language program, when all of the skill--building courses are taken concurrently, also serve as additional semesters for English--only students continuing from the Intensive English Program. English language courses for graduate and undergraduate students begin with PESL 0##. Undergraduate course sections begin with U. English language courses beginning with ELP 8## are taken by students opting into supplemental English language courses that are not part of a degree program.

More information about English competency requirements is available in the Undergraduate Admission section (p. 9) and Graduate Admission section of the university bulletins. Frequently Asked Questions (FAQs) about the English competency requirements are available on the English Language Services website (appliedtech.iit.edu/english-language-services/faqs-assessments).

PESL 021	Listening Enhancement I	3
PESL 022	Listening Enhancement II	3
PESL 031	Reading and Vocabulary Development I	3
PESL 032	Reading and Vocabulary Development II	3
PESL 040	Fundamentals of Academic Writing	3
PESL 041	Academic Writing I	3
PESL 042	Academic Writing II	3
PESL 061	Effective Communication I	3
PESL 062	Effective Communication II	3
ELP 821	Listening Enhancement I	3.5
ELP 822	Listening Enhancement II	3.5
ELP 831	Reading and Vocabulary Development I	3.5
ELP 832	Reading and Vocabulary Development II	3.5
ELP 840	Fundamentals of Academic Writing	3.5
ELP 841	Academic Writing I	3.5
ELP 842	Academic Writing II	3.5
ELP 861	Effective Communication I	3.5

ELP 862	Effective Communication II	3.5
ELP 899	Special Topics in English as a Second Language	9

Intensive English Program

The Intensive English Program (IEP) at Illinois Institute of Technology is designed to meet the personal, professional, and academic goals of international students. The program consists of the following:

- Four levels of instruction, from high-beginning to advanced
- Core skills: Listening/Speaking, Reading/Writing, Grammar
- Elective courses: American Culture, Pronunciation, and Test Prep
- 18 total hours of class per week = 18 credit hour equivalents (no credit toward degrees)
- Classes meet daily Monday to Friday between 9 a.m. and 5 p.m. Click here to view example schedule.
- 15 students average in a class

Students accepted to the IEP will study English, meet new people from different countries and cultures, and will experience Chicago while preparing for their academic and professional careers. Experienced full-time and part-time instructors with graduate degrees assist students in achieving their language goals.

Please visit english.iit.edu/iep for more information.

IEP 021	IEP Listening and Speaking Level I	8.5
IEP 022	IEP Listening and Speaking Level II	6
IEP 023	IEP Listening and Speaking Level III	6
IEP 024	IEP Listening and Speaking Level IV	6
IEP 025	IEP Listening and Speaking	1-10
IEP 026	Pronunciation	3
IEP 028	Advanced Pronunciation	3
IEP 041	IEP Reading and Writing Level I	6
IEP 042	IEP Reading and Writing Level II	6
IEP 043	IEP Reading and Writing Level III	6
IEP 044	IEP Reading and Writing Level IV	6
IEP 045	IEP Reading and Writing	1-10
IEP 061	IEP Grammar Level I	3
IEP 062	IEP Grammar Level II	3
IEP 063	IEP Grammar Level III	3
IEP 064	IEP Grammar Level IV	3
IEP 065	IEP Grammar	4.3
IEP 071	Introduction to United States Culture	3
IEP 073	United States Culture	3
IEP 075	TOEFL Preparation for IEP	3
IEP 077	GRE Preparation for IEP	3
IEP 081	English for Special Purposes	1.9-4.9
IEP 082	English for Special Purposes: Architecture	1.9-4.9
IEP 083	English for Special Purposes: Engineering	1.9-4.9
IEP 096	Independent Study and Special Projects	21

COLLEGES

Armour College of Engineering (p. 40)

Kenneth T. Christensen
Dean
Perlstein Hall, Suite 224
10 W. 33rd St.
Chicago, IL 60616
312.567.3009
iit.edu/engineering

Armour College of Engineering traces its roots to Armour Institute, founded in 1892 to prepare students of all backgrounds for leadership roles—primarily as engineers—in a challenging industrial society. Armour College carries on that tradition of excellence in engineering education and research.

Today, Armour College is home to about 100 full-time faculty, almost 2,200 undergraduate and graduate students, and the graduate and undergraduate programs of five engineering departments.

Undergraduate degrees offered by Armour College are accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology. All Illinois Institute of Technology graduate and undergraduate programs are also accredited by the Higher Learning Commission (HLC).

The mission of Armour College of Engineering is to: provide state-of-the-art education and research programs that enhance Armour's reputation as an internationally recognized engineering school; educate a new breed of engineers with a strong fundamental knowledge of engineering principles and an understanding and appreciation of the economic, environmental, and social forces that impact intellectual choices; and strengthen Armour's leadership role by focusing on the core research competencies and enhancing partnerships with industry, government laboratories, and academic and research institutions.

College of Architecture (p. 110)

Reed Kroloff
Dean
S.R. Crown Hall
3360 S. State St.
Chicago, IL 60616
312.567.3230
arch.iit.edu

The program in architecture was established at Armour Institute of Technology, one of Illinois Institute of Technology's predecessors, in 1895. In 1938, the program came under the directorship of the world-renowned architect and educator Ludwig Mies van der Rohe. The college is housed in S. R. Crown Hall, a National Historic Landmark, one of Mies' most significant buildings, and a major contribution to Chicago's rich architectural heritage. The college emphasizes applied studio work under the instruction of practicing architects; the study of architectural theory; interdisciplinary learning; digital technologies; sustainability; design/build; and international study.

College of Computing (p. 119)

Lance Fortnow
Dean
IIT Tower, Suite 1400
10 W. 35th Street
Chicago, IL 60616
312.567.5922
iit.edu/computing

The College of Computing, founded in 2020, is the newest college at Illinois Tech dedicated to ensuring students across campus have the computing and data science ideas and skills needed to succeed in today's technological society. The college offers dozens of degrees and certificates in computing from the foundational to the applied as well as mathematical and manufacturing processes through our four departments/programs: Applied Mathematics, Computer Science, Industrial Technology and Management and Information Technology and Management."

Lewis College of Science and Letters (p. 176)

Christine L. Himes

Interim Dean
Robert A. Pritzker Science Center, Room 252
3105 S. Dearborn St.
Chicago, IL 60616
312.567.3956
iit.edu/science-letters

The Lewis College of Science and Letters traces its roots to the Lewis Institute, founded in 1895, and to Armour Institute of Technology, founded in 1892. Our undergraduate and graduate programs are designed to emphasize the free spirit and broad perspectives traditionally reserved for the liberal arts, while fostering the development of valuable skills such as scientific thinking, research, data analysis, and communications. The college offers rigorous and relevant programs in the sciences and humanities at the undergraduate and graduate level (including master's, professional master's, and Ph.D.) through seven departments: biology; chemistry; food science and nutrition; humanities; physics; psychology; and social sciences.

Stuart School of Business (p. 308)

John F. O. Bilson
Dean
IIT Tower, 18th Floor
10 W 35th Street
Chicago, IL 60616
312.906.6500
iit.edu/stuart

Stuart School of Business provides intellectually rigorous business and management education at all levels, from baccalaureate to doctoral. All Stuart programs are designed to educate tomorrow's global innovators through the unique concept of strategic competitiveness. Constructs including creativity, innovation, entrepreneurship, incisiveness, leadership, and sustainability are interwoven throughout coursework and professional development opportunities, offering students thorough preparation for the challenges of the next economy.

Stuart was established in 1969 with a gift from Illinois Institute of Technology alumnus and noted financier Harold Leonard Stuart. The school houses the Entrepreneurship Academy, the Center for Financial Innovation, and the Center for Strategic Competitiveness.

Stuart offers the following degrees: B.S. in Business Administration, co-terminal B.S.B.A. and M.P.A, co-terminal B.S.B.A. and M.S. in Finance, co-terminal B.S.B.A. and M.S. in Marketing Analytics, Master of Business Administration (M.B.A.), Master of Mathematical Finance (M.M.F.) offered in partnership with the College of Science Department of Applied Mathematics, M.S. in Environmental Management and Sustainability, M.S. in Finance, M.S. in Management Science, M.S. in Marketing Analytics, Master of Public Administration (M.P.A.), Master of Technological Entrepreneurship, and Ph.D. in Management Science. A series of dual degrees with Chicago-Kent College of Law and Institute of Design are also offered, as well as numerous graduate certificate programs.

Graduate Education at Illinois Institute of Technology

Chicago-Kent College of Law

Anita K. Krug
Dean
565 W. Adams St.
Chicago, IL 60661
312.906.5000
kentlaw.iit.edu

Chicago-Kent College of Law is the second-oldest law school in Illinois. When it joined the university in 1969, Illinois Institute of Technology became the first major institute of technology to include law among its disciplines.

Chicago-Kent offers programs leading to the degrees of Juris Doctor, Master of Laws, and Doctor of the Science of Law, and participates in joint-degree programs with Stuart School of Business and the University of Illinois-Chicago.

Institute of Design

Denis Weil
Dean
3137 S. Federal St.
Chicago, IL 60616
312.595.4900
id.iit.edu

Since its founding as the New Bauhaus in 1937, the Institute of Design has grown into the largest full-time graduate-only design program in the U.S. with students from around the world. The school offers a professional Master of Design degree program with areas of study in communication design, interaction design, product design, strategic design, systems thinking, and user research; a dual Master of Design/ M.B.A. degree program in partnership with the Stuart School of Business; the Master of Design Methods, a nine-month program for mid-career professionals; and a Ph.D. in Design. The Institute of Design created the country's first Ph.D. design program in 1991.

Armour College of Engineering

Kenneth T. Christensen
Dean
Perlstein Hall, Suite 224
10 W. 33rd St.
Chicago, IL 60616
312.567.3009
iit.edu/engineering

Armour College of Engineering traces its roots to Armour Institute, founded in 1892 to prepare students of all backgrounds for leadership roles—primarily as engineers—in a challenging industrial society. Armour College carries on that tradition of excellence in engineering education and research.

Today, Armour College is home to about 100 full-time faculty, almost 2,200 undergraduate and graduate students, and the graduate and undergraduate programs of five engineering departments.

Undergraduate degrees offered by Armour College are accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology. All Illinois Institute of Technology graduate and undergraduate programs are also accredited by the Higher Learning Commission (HLC).

The mission of Armour College of Engineering is to: provide state-of-the-art education and research programs that enhance Armour's reputation as an internationally recognized engineering school; educate a new breed of engineers with a strong fundamental knowledge of engineering principles and an understanding and appreciation of the economic, environmental, and social forces that impact intellectual choices; and strengthen Armour's leadership role by focusing on the core research competencies and enhancing partnerships with industry, government laboratories, and academic and research institutions.

Biomedical Engineering (p. 42)

Chemical and Biological Engineering (p. 53)

Civil, Architectural, and Environmental Engineering (p. 61)

Electrical and Computer Engineering (p. 79)

Mechanical, Materials, and Aerospace Engineering (p. 95)

Minors

Biomedical Engineering

Wishnick Hall, Suite 314
3255 S. Dearborn St.
Chicago, IL 60616
312.567.5324
bme@iit.edu
iit.edu/bme

Chair
John G. Georgiadis

Faculty with Research Interests
For information regarding faculty visit the Department of Biomedical Engineering website.

Mission

The mission of the biomedical engineering undergraduate program is to educate students in the fundamentals of biomedical engineering. This foundation consists of a broad exposure to the chemical, mathematical, physical, and biological sciences, coupled with the appropriate technical and engineering skills to be able to fill diverse professional roles in industry, graduate school, and the medical professions.

Biomedical Engineering at Illinois Institute of Technology

Biomedical engineering is an interdisciplinary major in which the principles and tools of traditional engineering fields such as mechanical, materials, electrical, and chemical engineering are integrated with the chemical, physical, and biological sciences. Together, they are applied towards a better understanding of physiological processes in humans or towards the solution of medical problems. Engineering will continue to play an increasingly important role in advancing medical treatment, developing biotechnology, and improving healthcare delivery. By its very nature, biomedical engineering is expansive and requires a broad and integrated foundation in the physical, chemical, mathematical, and biological sciences.

Program Outcomes and Objectives

At the undergraduate level, the department offers a four-year engineering curriculum leading to a Bachelor of Science (B.S.) in Biomedical Engineering.

Our students will attain the following outcomes by the time of their graduation:

- An ability to apply knowledge of mathematics, science, and engineering
- An ability to design and conduct experiments, as well as to analyze and interpret data
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- An ability to function on multi-disciplinary teams
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility
- An ability to communicate effectively
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- A recognition of the need for and an ability to engage in life-long learning
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

The program educational objectives for the BME program are:

- Graduates will meet the expectations of employers of biomedical engineers
- Qualified graduates will pursue advanced study if they so desire
- Graduates will assume/undertake leadership roles in their professions

Areas of Specialization (Tracks)

The biomedical engineering program has three areas of specialization (or tracks): cell and tissue engineering, medical imaging, and neural engineering. While distinct in their concept, these areas share core exposure to the physical, chemical, biological, and engineering sciences. Thus, there is potential for considerable crossover among the areas at the upper-division level. This is indicated by the track course options.

Medical School Admission

For information regarding admission to medical schools, please visit iit.edu/pre-health-pre-med.

Degree Programs

- Bachelor of Science in Biomedical Engineering: Cell and Tissue Engineering Track (p. 44)
- Bachelor of Science in Biomedical Engineering: Medical Imaging Track (p. 47)
- Bachelor of Science in Biomedical Engineering: Neural Engineering Track (p. 50)

Co-Terminal Options

The Department of Biomedical Engineering also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biomedical Engineering/Master of Biomedical Imaging and Signals
- Bachelor of Science in Biomedical Engineering/Master of Chemical Engineering
- Bachelor of Science in Biomedical Engineering/Master of Science in Biology for the Health Professions

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Biomedical Engineering website (engineering.iit.edu/bme).

Bachelor of Science in Biomedical Engineering: Cell and Tissue Engineering Track

Cell and Tissue Engineering

This area involves the more recent attempts to understand and attack biomedical problems at the microscopic level and to use such knowledge to begin to “engineer” replacement tissues and organs from individual cells. Knowledge of anatomy, biochemistry, and the mechanics of cellular and sub-cellular structures is necessary in order to understand disease processes and to be able to intervene at very specific sites. With such knowledge a number of approaches have been or are being developed. These range from the development of miniature devices to deliver compounds that can stimulate or inhibit cellular processes at precise target locations in order to promote healing or inhibit disease formation and progression to the newer techniques that have produced replacement skin and one day will produce heart valves, coronary vessels, and even whole hearts. This area also includes the development of artificial materials used for implantation. Understanding the properties and behavior of living material is vital in the design of implant materials. The placement of materials in the human body for healing or repair has been practiced for over 100 years, but it remains one of the most difficult tasks faced by the biomedical engineer. Certain metal alloys, ceramics, polymers, and composites have been used as implantable materials. Bio-materials must not only function normally over the lifespan of the recipient but also be nontoxic, non-carcinogenic, chemically inert, stable, and sufficiently strong to withstand the repeated forces of a lifetime. Few materials meet all such specifications. Newer bio-materials are being developed which incorporate proteins or living cells in order to provide a truer biological and mechanical match for the living tissue.

Required Courses

Code	Title	Credit Hours
Biomedical Engineering Core Requirements		**(27)**
BME 100	Introduction to the Profession	2
BME 310	Biomaterials	3
BME 315	Instrumentation Laboratory	2
BME 320	Fluids Laboratory	1
BME 405	Physiology Laboratory	2
BME 419	Intro Design Concepts in BME	2
BME 420	Design Concepts in BME	3
BME 422	Math Methods for Boimdel Engrs	3
BME 433	BME Applications of Statistics	3
BME 453	Quantitative Physiology	3
ECE 308	Signals Systems	3
Cell and Tissue Engineering Requirements		**(39-40)**
CS 104	Intro to Comp Prgrm for Engrs	2
MMAE 200	Statics	3
ECE 211	Circuit Analysis I	3
CHEM 235	Organic Chemistry I-Lecture	3-4
or CHEM 237	Organic Chemistry I	
CHE 202	Material Energy Balances	3
BIOL 403	Biochemistry	4
BME 301	Bio Fluid Mechanics	3
BME 335	Thermodynamics of Livng Systms	3
BME 418	Reaction Kinetics for BME	3
BME 424	Quant Aspects Cell/Tissue Engg	3
BME 482	Mass Trnsprt for Biomdel Engrs	3
Select two BME electives [1]		6
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4

PHYS 221	Gen Physics II: Elect&Magntism	4
Chemistry Requirements		**(8)**
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
Biology Requirements		**(4)**
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Total Credit Hours		131-132

[1] BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS. ENGR 497 will apply.

Bachelor of Science in Biomedical Engineering: Cell and Tissue Engineering Track Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 100	2	CHEM 125	4
CHEM 124	4	MATH 152	5
CS 104	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	16		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CHEM 235 or 237	3-4	BIOL 115	3
ECE 211	3	BIOL 117	1
MATH 252	4	BME 315	2
MMAE 200	3	MATH 251	4
Humanities or Social Sciences Elective	3	PHYS 221	4
		Social Sciences Elective (300+)	3
	16-17		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 405	2	BIOL 403	4
BME 422	3	BME 301	3
BME 453	3	BME 310	3
CHE 202	3	BME 320	1
ECE 308	3	BME 335	3
Social Sciences Elective (300+)	3	IPRO Elective I	3
	17		17

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 418	3	BME 420	3
BME 419	2	BME 424	3
BME 433	3	BME Elective[1]	3
BME 482	3	IPRO Elective II	3
BME Elective[1]	3	Humanities Elective (300+)	3
Humanities Elective (300+)	3		
	17		15

Total Credit Hours: 131-132

1 BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS. ENGR 497 will apply.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Biomedical Engineering: Medical Imaging Track

Medical Imaging

This area combines knowledge of unique physical properties of electromagnetic and acoustic energy with high-speed electronic data processing, signal analysis, and rapid display to generate an image of a body part or, more recently, of a bodily function. Often, these images can be obtained with minimal or completely noninvasive procedures, making them less painful and more readily repeatable than invasive techniques. Moreover, many of the devices require no ionizing radiation doses, thereby lessening the danger of secondary radiation effects on the patient. The students learn the theoretical bases underlying the common forms of medical imaging, such as magnetic resonance imaging (MRI), computerized axial tomography scanning (CAT-scan), positron emission tomography (PET), and the limitations and the applicability of such techniques.

Required Courses

Code	Title	Credit Hours
Biomedical Engineering Core Requirements		**(27)**
BME 100	Introduction to the Profession	2
BME 310	Biomaterials	3
BME 315	Instrumentation Laboratory	2
BME 325	Bioelectronics Laboratory	1
BME 405	Physiology Laboratory	2
BME 419	Intro Design Concepts in BME	2
BME 420	Design Concepts in BME	3
BME 422	Math Methods for Boimdel Engrs	3
BME 433	BME Applications of Statistics	3
BME 453	Quantitative Physiology	3
ECE 308	Signals Systems	3
Medical Imaging Requirements		**(40-41)**
CS 104	Intro to Comp Prgrm for Engrs	2
CS 201	Accelerated Intro to Cmptr Sci	4
ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 437	Digital Signal Processing I	3
ECE 481	Image Processing	3
BME 309	Biomedical Imaging	3
BME 438	Neuroimaging	3
BME 443	Biomdel Instrmntn and Elect	3
BME 445	Quantitative Neural Function	3
MATH 333	Matrix Alg & Complex Variables	3-4
or CHEM 237	Organic Chemistry I	
PHYS 224	Gen Physics III for Engnrs	3
or CHEM 239	Organic Chemistry II	
Select one BME elective [1]		3
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Chemistry Requirements		**(8)**
CHEM 124	Princ of Chemistry I with Lab	4

CHEM 125	Prin of Chemistry II w/Lab	4
Biology Requirements		**(4)**
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Total Credit Hours		132-133

[1] BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS. ENGR 497 will apply.

Bachelor of Science in Biomedical Engineering: Medical Imaging Track Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 100	2	CHEM 125	4
CHEM 124	4	MATH 152	5
CS 104	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	16		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 201	4	BIOL 115	3
ECE 211	3	BIOL 117	1
MATH 252	4	BME 315	2
PHYS 221	4	ECE 213	4
Humanities or Social Sciences Elective	3	MATH 251	4
		Humanities Elective (300+)	3
	18		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 309	3	BME 310	3
BME 405	2	BME 325	1
BME 422	3	BME 443	3
BME 453	3	BME 445	3
ECE 308	3	MATH 333 or CHEM 237	3-4
Social Sciences Elective (300+)	3	IPRO Elective I	3
	17		16-17

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 419	2	BME 420	3
BME 433	3	BME 438	3
ECE 437	3	ECE 481	3
PHYS 224 or CHEM 239	3	BME Elective[1]	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
IPRO Elective II	3		
	17		15

Total Credit Hours: 132-133

1 BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS. ENGR 497 will apply.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Biomedical Engineering: Neural Engineering Track

Neural Engineering

This area uses fundamental and applied engineering techniques to help solve basic and clinical problems in the neurosciences. At the fundamental level, it attempts to understand the behavior of individual neurons, their growth, signaling mechanisms between neurons, and how populations of neurons produce complex behavior. Such information has broad application to a better understanding of the communication that occurs between the various parts of the nervous system and the brain. For example, such an understanding can be applied to the development of replacement parts for impaired neural systems, such as the auditory, visual, and motor systems, as well as achieving a better understanding of how normal and diseased systems work.

Required Courses

Code	Title	Credit Hours
Biomedical Engineering Core Requirements		**(27)**
BME 100	Introduction to the Profession	2
BME 310	Biomaterials	3
BME 315	Instrumentation Laboratory	2
BME 325	Bioelectronics Laboratory	1
BME 405	Physiology Laboratory	2
BME 419	Intro Design Concepts in BME	2
BME 420	Design Concepts in BME	3
BME 422	Math Methods for Boimdel Engrs	3
BME 433	BME Applications of Statistics	3
BME 453	Quantitative Physiology	3
ECE 308	Signals Systems	3
Neural Engineering Requirements		**(40-41)**
CS 104	Intro to Comp Prgrm for Engrs	2
ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 218	Digital Systems	4
BME 309	Biomedical Imaging	3
BME 438	Neuroimaging	3
BME 443	Biomdel Instrmntn and Elect	3
BME 445	Quantitative Neural Function	3
MATH 333	Matrix Alg & Complex Variables	3-4
or CHEM 237	Organic Chemistry I	
CHEM 239	Organic Chemistry II [1]	3
Select three BME electives [2]		9
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Chemistry Requirements		**(8)**
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
Biology Requirements		**(4)**
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1

Interprofessional Projects (IPRO)	**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)	6
Humanities and Social Science Requirements	**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)	21
Total Credit Hours	132-133

1 A technical elective may substitute for CHEM 239.

2 BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS. ENGR 497 will apply.

Bachelor of Science in Biomedical Engineering: Neural Engineering Track Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 100	2	CHEM 125	4
CHEM 124	4	MATH 152	5
CS 104	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	16		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 211	3	BIOL 115	3
ECE 218	4	BIOL 117	1
MATH 252	4	BME 315	2
PHYS 221	4	ECE 213	4
Humanities or Social Sciences Elective	3	MATH 251	4
		Social Sciences Elective (300+)	3
	18		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 309	3	BME 310	3
BME 405	2	BME 325	1
BME 422	3	BME 443	3
BME 453	3	BME 445	3
ECE 308	3	MATH 333 or CHEM 237	3-4
Humanities Elective (300+)	3	IPRO Elective I	3
	17		16-17

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BME 419	2	BME 420	3
BME 433	3	BME 438	3
CHEM 239[1]	3	BME Elective[2]	3
BME Elective[2]	3	IPRO Elective II	3
BME Elective[2]	3	Social Sciences Elective (300+)	3
Humanities Elective (300+)	3		
	17		15

Total Credit Hours: 132-133

1 A technical elective may substitute for CHEM 239.

2 BME elective must be chosen from the approved list of 300+ level engineering courses in BME, ECE, CHE, MMAE, CAE, or CS. ENGR 497 will apply.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Chemical and Biological Engineering

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Chair
Sohail Murad

Faculty with Research Interests
For information regarding faculty visit the Department of Chemical and Biological Engineering website.

The department offers leading edge research and education programs in chemical engineering and biological engineering. These programs are aimed to prepare engineers for the technological challenges of the 21st century by providing students with:

- Fundamental knowledge and design capability in chemical, biological, and environmental engineering, food process engineering, and pharmaceutical engineering
- Advanced research programs in core competency areas
- Understanding of ethical, economic, and social issues that influence technology choices
- Leadership and communication skills
- Life-long learning capabilities

The objective of the undergraduate program is to educate chemical engineering students and prepare them for careers in professional practice and/or for advanced studies at the graduate level. The program specifically aims to develop a new breed of engineers who are not only well schooled in the basics and fundamentals of chemical and biological engineering, but who also possess the skills necessary for success in today's workplace. In recognition of the recent shift of the chemical engineering profession into a more prominent involvement in biotechnology and biological engineering, the department has redesigned the undergraduate curriculum in order to ensure that its graduates will possess additional knowledge and skills in biology and biological engineering as predicated by the changing needs of industry.

Degree Programs

- Bachelor of Science in Chemical Engineering (p. 54)

Co-Terminal Options

The Department of Chemical and Biological Engineering also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biomedical Engineering/Master of Chemical Engineering
- Bachelor of Science in Chemical Engineering/Master of Biological Engineering
- Bachelor of Science in Chemical Engineering/Master of Chemical Engineering
- Bachelor of Science in Chemical Engineering/Master of Engineering in Environmental Engineering
- Bachelor of Science in Chemical Engineering/Master of Food Process Engineering

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Chemical and Biological Engineering website (engineering.iit.edu/chbe).

Other Degree Programs in Chemical and Biological Engineering

B.S., M.S., professional master's, and Ph.D. degree programs are offered in chemical engineering. A professional master's degree is offered in biological engineering. M.S. and professional master's degree programs are also offered in chemical engineering/computer science. The department also offers a B.S./M.D. program in engineering and medicine (p. 31) and a combined undergraduate/graduate law program (p. 29).

Minors

- Minor in Polymer Science and Engineering (p. 60)

Bachelor of Science in Chemical Engineering

Chemical engineering is concerned with the design, development, and management of facilities that convert raw materials into useful products. The engineer must assume responsibility for the economical use of the raw materials, preservation of the environment, and profitability of the operation. The chemical engineering program has been designed to provide both the engineering competence and the professional skills necessary to succeed in this endeavor. In order to achieve this objective, the curriculum incorporates coursework in both of these areas throughout the four-year duration of the program.

Coursework

The chemical engineering curriculum emphasizes basic knowledge and applications of transport processes, thermodynamics and kinetics of processes, automatic control, and design, as well as fundamental sciences, mathematics, and engineering sciences. Design experience is spread across the curriculum, beginning with the Introduction to the Profession courses. Equipment design is emphasized in courses such as Fluid Mechanics, Heat and Mass-Transfer Operations, Thermodynamics, and Chemical Reaction Engineering. Control-system design is practiced in the Process Control course. Process modeling, simulations, and optimization are discussed and practiced in Transport Phenomena, Process Modeling and System Theory, Numerical and Data Analysis, Statistical Tools for Engineering, and Process Control courses. The capstone design courses (Chemical Process Design I & II) integrate these design concepts and practice process design and optimization. In addition to engineering competence, the program also examines the economic, environmental, and societal implications of chemical engineering.

Professional Training

Professional training is stressed in the design of the chemical engineering curriculum. Because engineering is largely a team effort, the department develops the individual's ability to work effectively as a team member. Group projects are assigned starting with the Introduction to the Profession course. Laboratory course and capstone design course projects are conducted by teams of students. The laboratory work is designed to reinforce the concepts developed in the lectures and to show the application of chemical engineering principles to the solution of real-world problems.

Because individual attention is so important to the student's growth, laboratory sections are small and a high-level of personal contact between student and instructor is maintained. Students are encouraged to become involved with state-of-the-art research projects at the undergraduate level. The industry/university co-op program is available to students who would like to use one or more extra semesters any time after their second year to work on an internship in industry.

Specialized Programs

In addition to the core curriculum, special programs exist to accommodate students who want to develop more extensive background in related areas. With their exposure to a wide range of industrial applications and problems, students are better equipped to make a decision to explore an area of interest in depth. Professional specializations are available in:

- Bioengineering
- Energy/Environment/Economics (E3)
- Environmental Engineering
- Polymer Science and Engineering
- Process Design and Operation

Students may also choose a minor program (p. 26). All students must include in their minor program, or as a technical elective, CHE 426 or at least one three credit hour engineering science course. Students who plan to go to graduate school are advised to take CHE 535 as a technical elective.

Required Courses

Code	Title	Credit Hours
Chemical Engineering Requirements		**(47)**
CHE 100	Intro to the Profession I	2
CHE 101	Intro to the Profession II	2
CHE 202	Material Energy Balances	3
CHE 239	Math & Computational Methods	3
CHE 301	Fluid Mechanics	3
CHE 302	Heat Mass Trnsfr Operations	3
CHE 311	Fndtn Biol Sci Engineering	3
CHE 317	Cheml & Biol Engr Laboratory I	2
CHE 351	Thermodynamics I	3

CHE 406	Transport Phenomena	3
CHE 418	Cheml&Biol Engrg Laboratory II	2
CHE 423	Chemical Reaction Engineering	3
CHE 433	Process Modeling/System Theory	3
CHE 435	Process Control	3
CHE 451	Thermodynamics II	3
CHE 494	Process Design I	3
CHE 496	Process Design II	3
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Chemistry Requirements		**(18)**
CHEM 125	Prin of Chemistry II w/Lab [1]	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 343	Physical Chemistry I	3
CHEM 344	Physical Chemistry II	4
or BIOL 403	Biochemistry	
Computer Science Requirement		**(2)**
CS 104	Intro to Comp Prgrm for Engrs	2
or CS 105	Intro to Computer Programming	
Electrical and Computer Engineering Requirement		**(3-4)**
ECE 211	Circuit Analysis I	3-4
or ECE 218	Digital Systems	
Technical Electives		**(9)**
Select nine credit hours [2]		9
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Total Credit Hours		132-133

1. Initial placement in CHEM 125 requires consent of the chemistry department.
2. One technical elective must be CHE 426 or an engineering science elective (CHE 400+ level).

Bachelor of Science in Chemical Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
CHE 100	2	CHE 101	2
MATH 151	5	MATH 152	5
CHEM 125[1]	4	PHYS 123	4
CS 104 or 105	2	Social Sciences Elective	3
Humanities 200-level Course	3	Humanities or Social Sciences Elective	3
	16		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CHE 202	3	CHE 239	3
MATH 252	4	CHE 301	3
CHEM 237	4	MATH 251	4
PHYS 221	4	CHEM 239	3
Humanities Elective (300+)	3	CHEM 343	3
	18		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CHE 302	3	CHE 317	2
CHE 311	3	CHE 433	3
CHE 351	3	CHE 451	3
ECE 211 or 218	3-4	CHEM 344 or BIOL 403	4
Humanities Elective (300+)	3	IPRO Elective I	3
		Technical Elective[2]	3
	15-16		18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
CHE 418	2	CHE 406	3
CHE 423	3	CHE 496	3
CHE 435	3	IPRO Elective II	3
CHE 494	3	Technical Elective[2]	3
Technical Elective[2]	3	Social Sciences Elective (300+)	3
Social Sciences Elective (300+)	3		
	17		15

Total Credit Hours: 132-133

1. Initial placement in CHEM 125 requires the consent of the chemistry department.
2. One technical elective must be CHE 426 or an engineering science elective (CHE 400+ level).

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Professional Specializations

Students choosing one of the professional specializations should take a total of three courses in the specialization area.

Appropriate substitutions may be made with the approval of the program adviser.

Bioengineering

Program advisers: S. Parulekar and V. Pérez-Luna

Bioengineering has two career specializations:

Biomedical Engineering

Code	Title		Credit Hours
BIOL 107	General Biol Lecture		3
BIOL 115	Human Biology		3
Select one elective from the following:			3
BIOL 214	Genetics	3	
or BIOL 414	Genetics Engineering Scientist		
BIOL 401	Introductory Biochemistry	3	
BIOL 430	Human Physiology	3	
BIOL 445	Cell Biology	3	
CHE 491	Undergraduate Research	1-6	
CHE 577	Bioprocess Engineering	3	

Biotechnology

Code	Title		Credit Hours
Select three electives from the following:			9
BIOL 107	General Biol Lecture	3	
BIOL 214	Genetics	3	
or BIOL 414	Genetics Engineering Scientist		
BIOL 401	Introductory Biochemistry	3	
BIOL 445	Cell Biology	3	
CHE 577	Bioprocess Engineering	3	

Energy/Environment/Economics (E3)

Program adviser: H. Arastoopour

Code	Title		Credit Hours
CHE 543	Energy Envir Economics		3
Energy Sources, Conversion, Utilization, and Distribution			**(3)**
Select at least one course from the following:			3
CHE 465	Electrochem Energy Cnvrsn	3	
CHE 467	Fuel Cell Syst Design	3	
CHE 489	Fluidization	3	
CHE 491	Undergraduate Research	1-6	
CHE 541	Renwble Engry Technologies	3	
CHE 542	Fludzatn Gas-Solids Flw System	3	
CHE 565	Fund of Electrochemistry	3	
CHE 567	Fuel Cell Fundamentals	3	
CHE 582	Intfcl Clldl Phnmna Applctn	3	
ECE 319	Fndmntls of Power Engrn	4	
ECE 411	Power Electronics	4	
ECE 419	Power Systems Analysis w/Lab	4	
ECE 420	Analyt. Methods for Power Syst	3	
ECE 438	Control Systems	3	
MMAE 425	Direct Energy Conversion	3	

MMAE 426	Nuclear F-F & Sust Energy Sys	3	
MMAE 524	Fundamentals of Combustion	3	
MMAE 525	Fundamentals of Heat Transfer	3	
Energy and Environment, System Analysis, and Special Problems			**(3)**
Select at least one course from the following:			3
CHE 426	Statistical Tools Engineers	3	
ECE 491	Undergraduate Research	1-3	
ECON 423	Econ Anal Capital Investments	3	
ENVE 404	Water & Wastewater Engineering	3	
ENVE 463	Intro Air Pollution Control	3	
ENVE 485	Industrial Ecology	3	
IPRO 497	Interprofessional Project	3	
MMAE 491	Undergraduate Research	1-6	
MMAE 494	Undergraduate Design Project	1-3	
MMAE 497	Undergraduate Special Topics	1-6	
PS 338	Energy Policy	3	

Environmental Engineering

Program adviser: B. Stephens

Code	Title		Credit Hours
Environmental Engineering			**(3)**
Select at least one course from the following:			3
CHE 426	Statistical Tools Engineers	3	
ENVE 404	Water & Wastewater Engineering	3	
ENVE 463	Intro Air Pollution Control	3	
ENVE 485	Industrial Ecology	3	
Civil Engineering			**(3)**
Select at least one course from the following:			3
CAE 421	Risk Assessment Engrg	3	
CAE 482	Hydraulic Dsgn Open Chnnl Syst	3	
IPRO 497	Interprofessional Project	3	

Polymer Science and Engineering

Program advisers: J. Schieber

The program embraces polymer chemistry, characterization, structure and properties, as well as the manufacture of polymeric raw materials and their processing into finished products.

Code	Title		Credit Hours
Select one course from the following:			3
CHE 470	Intro Polymer Science	3	
CHEM 470	Introduction to Polymers	3	
MMAE 470	Intro to Polymer Science	3	
Select at least one course from the following:			3
CHE 538	Polymerization Reaction Engrg	3	
CHE 555	Polymer Processing	3	
CHE 575	Polymer Rheology	3	
CHEM 535	Polymer Synthesis	3	
CHEM 537	Polymer Chemistry Laboratory	3	
CHEM 542	Polymer Charact & Analysis	3	
MMAE 579	Advanced Materials Processing	3	
Students may take up to one of the following courses:			3
CHE 426	Statistical Tools Engineers	3	

CHE 489	Fluidization	3
CHE 491	Undergraduate Research	1-6
CHE 582	Intfcl Clldl Phnmna Applctn	3
MMAE 451	Finite Elmnt Methods in Engrg	3
MMAE 485	Manufacturing Processes	3

Process Design and Operation

Program adviser: D. Chmielewski

For students interested in design, operation, monitoring, optimization, and control of chemical processes.

Code	Title		Credit Hours
Select at least one course from the following:			3
CHE 426	Statistical Tools Engineers	3	
CHE 508	Process Dsgn Optimization	3	
CHE 530	Advanced Process Control	3	
CHE 560	Ststcl Qlty Process Control	3	
Select at least one course from the following: [1]			3
CHE 465	Electrochem Energy Cnvrsn	3	
CHE 489	Fluidization	3	
CHE 491	Undergraduate Research	1-6	
ENVE 463	Intro Air Pollution Control	3	
ENVE 476	Engrg Control Ind Hazards	3	
ENVE 485	Industrial Ecology	3	
ENVE 578	Phys&Chem Prcs Indus Gas Clng	3	
ENVE 580	Hazardous Waste Engineering	3	

1 Only one course selection may be an ENVE course.

Minor in Polymer Science and Engineering

Required Courses

This minor consists of 15 credit hours.

Code	Title		Credit Hours
Select a minimum of one course from the following:			3
CHE 470	Intro Polymer Science	3	
CHEM 470	Introduction to Polymers	3	
MMAE 470	Intro to Polymer Science	3	
Select a minimum of three courses from the following:			9
CHE 538	Polymerization Reaction Engrg	3	
CHE 555	Polymer Processing	3	
CHE 575	Polymer Rheology	3	
CHEM 535	Polymer Synthesis	3	
CHEM 537	Polymer Chemistry Laboratory	3	
CHEM 542	Polymer Charact & Analysis	3	
MMAE 579	Advanced Materials Processing	3	
Select one of the following:			3
CHE 426	Statistical Tools Engineers	3	
CHE 489	Fluidization	3	
CHE 491	Undergraduate Research	1-20	
CHE 582	Intfcl Clldl Phnmna Applctn	3	
MMAE 451	Finite Elmnt Methods in Engrg	3	
MMAE 485	Manufacturing Processes	3	
Total Credit Hours			15

Appropriate substitutions may be made with the approval of the minor adviser.

Civil, Architectural, and Environmental Engineering

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Chair
Brent Stephens

Faculty with Research Interests
For information regarding faculty visit the Department of Civil, Architectural, and Environmental Engineering website.

Civil engineering is the oldest engineering profession. Since ancient times, civil engineers have played a vital role in designing, building, and maintaining the infrastructure that makes societies work. That role is even more important today; more than half of the world's population lives in cities and our aging, urban infrastructure is badly in need of repair and replacement. To prepare our graduates to deal with these challenges, the Department of Civil, Architectural, and Environmental Engineering at Illinois Institute of Technology offers degree programs in architectural engineering, civil engineering, and engineering management.

Architectural engineers focus on buildings. In collaboration with architects and engineers from other disciplines, they design and build structures with an eye on energy use, environmental impacts, human health, economics, and sustainability. Architectural engineering requires knowledge of architectural design; electrical, mechanical, and plumbing systems; structural engineering; and construction management.

Civil engineers work on infrastructure projects. Examples include highways, railroads, water supply and treatment systems, airports, waterways, tunnels, and buildings. Focus areas within civil engineering include structural engineering, geotechnical engineering, transportation engineering, construction engineering and management, and environmental engineering. In all cases, civil engineers work to design infrastructure that protects human and environmental health, uses resources wisely, and improves quality of life.

Engineering management professionals bring new ideas into products and services in any field of engineering. At Illinois Institute of Technology, the engineering management degree combines engineering, project management, business planning, and entrepreneurship. The engineering concentration can be in architectural, biomedical, chemical, civil, computer, electrical, or mechanical engineering.

In response to the growing demand for advanced degrees, all of these programs are designed to fit into Illinois Institute of Technology's co-terminal degree program, which makes it possible for students to complete both a bachelor's and master's degree in as few as five years. Undergraduates who satisfy the grade point average requirement can apply to the co-terminal program as early as their fourth semester.

Degree Programs

- Bachelor of Science in Architectural Engineering (p. 63)
- Bachelor of Science in Civil Engineering (p. 67)
- Bachelor of Science in Engineering Management (p. 71)

Co-Terminal Options

The Department of Civil, Architectural, and Environmental Engineering also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Architecture/Master of Engineering in Construction Engineering and Management
- Bachelor of Science in Architectural Engineering/Master of Engineering in Architectural Engineering
- Bachelor of Science in Architectural Engineering/Master of Engineering in Construction Engineering and Management
- Bachelor of Science in Architectural Engineering/Master of Engineering in Structural Engineering
- Bachelor of Science in Chemical Engineering/Master of Engineering in Environmental Engineering
- Bachelor of Science in Civil Engineering/Master of Engineering in Construction Engineering and Management
- Bachelor of Science in Civil Engineering/Master of Engineering in Environmental Engineering
- Bachelor of Science in Civil Engineering/Master of Engineering in Geotechnical Engineering
- Bachelor of Science in Civil Engineering/Master of Engineering in Structural Engineering
- Bachelor of Science in Civil Engineering/Master of Engineering in Transportation Engineering
- Bachelor of Science in Engineering Management/Master of Public Administration

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Civil, Architectural, and Environmental Engineering website (engineering.iit.edu/caee).

Minors

- Minor in Building Systems Engineering (p. 76)
- Minor in Construction Management (p. 76)
- Minor in Engineering Graphics and CAD (p. 76)
- Minor in Environmental Engineering (p. 77)
- Minor in Graphics and CAD for Non-Engineers (p. 77)
- Minor in Structural Engineering (p. 77)
- Minor in Transportation Engineering (p. 78)

Certificate in Engineering Graphics and CAD

Engineering graphics is an indispensable communication and design tool concerned with the graphical representation of designs and specifications for physical objects and data relationships used in engineering, science, business, and technical work. The graphic language, along with the symbolic and verbal languages, enables those engaged in technology to communicate effectively, making it possible for new ideas, designs, and developments to be transformed into useful consumer products. The well-trained engineer, scientist, or technician must be able to make correct graphical representations of engineering structures, designs, and data relationships, as well as possess an ability to express ideas quickly and accurately through the use of the graphic language.

Recognizing the need for drafters and designers with a strong background in special areas of graphics, the Department of Civil, Architectural, and Environmental Engineering offers a Certificate in Engineering Graphics. This certificate, which is designed to prepare specialists in graphics for positions in business and industry, is only available to students enrolled in a degree program at Illinois Institute of Technology.

This certificate is only available to students enrolled in a degree program at the university and does not qualify for federal financial aid.

Students completing the specified courses with satisfactory grades will be awarded a certificate of completion.

Students must take:

Code	Title	Credit Hours
An introductory Engineering Graphics and Design course [1]		2-3
EG 305	Advanced Engr Graphic&Design	3
EG 306	Engr Descriptive Geometry	3
EG 405	Mechanical Dsgn Graphics	3
EG 406	Technical & Pictorial Illust	3
EG 419	Computer Graphics in Engnr	3
EG 430	Intro Building Info Modeling	3
Total Credit Hours		20-21

1 CAE 100 and CAE 101, MMAE 232, or an equivalent introductory course.

Bachelor of Science in Architectural Engineering

The objective of the architectural engineering program is to prepare graduates to enter and be successful in the architectural engineering profession. Graduates are expected to become licensed professional engineers, and to reach responsible positions in a wide range of professional settings, including consulting firms, industry, or government. This program will prepare students to begin and successfully complete graduate studies in engineering and/or post-baccalaureate education in a professional degree program. The architectural engineering program provides breadth in core sub-disciplines and depth in at least one area of specialization. This degree program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Architectural engineering is a building-oriented discipline that offers students an opportunity to obtain an engineering education specializing in building architecture, building-system integration, or structural and computer-aided design.

Professional architectural engineers are concerned with the structural integrity of buildings; the design and analysis of HVAC (Heating, Ventilating, and Air Conditioning); plumbing, fire protection and electrical systems; acoustics; lighting; energy conservation; building science and the study of building performance; and the management of construction resources and schedules. Graduates of the architectural engineering program will be well prepared for careers as consulting engineers, building contractors, construction managers, structural engineers, and knowledgeable specialists in related areas of building design and analysis.

Architectural engineering shares much in common with civil and mechanical engineering but is distinct in its exclusive concentration on building projects. Architectural engineering students should have an aptitude in and an appreciation of the following areas of knowledge: basic principles of mathematics; physics and chemistry; manual and computer-aided drafting and design; surveying; construction materials; engineering mechanics; structural analysis and design; building-system integration; and professional practice and ethics.

Architecture students who plan to pursue a Master of Engineering in Architectural Engineering degree should take the following courses:

CAE 208	Thermal-Fluids Engineering I	3
CAE 209	Thermal-Fluids Engineering II	3
CAE 383	Electrical and Electronic Circuits	3

Students should consult the Master of Engineering in Architectural Engineering curriculum for additional details.

Required Courses

Code	Title	Credit Hours
Architectural Engineering Requirements		**(48)**
CAE 100	Intro to Engg Drawing & Design	2
CAE 101	Intro to AutoCAD Draw Design	2
CAE 105	Geodetic Science	3
CAE 110	Professional Practice I	1
CAE 111	Professional Practice II	1
CAE 209	Thermal-Fluids Engineering II	3
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 307	Structural Design II	3
CAE 315	Materials of Construction	3
CAE 323	Intro to Geotechnical Engineer	3
CAE 331	Building Science	3
CAE 383	Electrical Electronic Circuits	3
CAE 461	Plumbing/Fire Protection Dsgn	3
CAE 464	HVAC Systems Design	3
CAE 468	Architectural Design	3
CAE 470	Constrctn Methods&Cost Estmg	3
CAE 471	Construction Plan & Scheduling	3
Capstone Design Requirement		**(3)**
CAE 495	Capstone Senior Design	3
CAE Technical Electives		**(9)**
Select nine credit hours [1]		9
CAE Additional Science Requirement		**(3)**

CAE 208	Thermal-Fluids Engineering I	3
Mathematics Requirements		**(21)**
CAE 312	Engineering Systems Analysis	3
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Chemistry Requirement		**(4)**
CHEM 124	Princ of Chemistry I with Lab	4
Computer Science Requirement		**(2)**
CS 104	Intro to Comp Prgrm for Engrs	2
or CS 105	Intro to Computer Programming	
Engineering Course Requirements		**(6)**
CAE 286	Theory&Concpt of Struct Mechcs	3
CAE 287	Mechanics Structural Materials	3
Humanities Requirements		**(3)**
AAH 119	Hist of World Architecture I	3
or AAH 120	Hist of World Architecture II	
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Sciences Requirements		**(18)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		18
Total Credit Hours		131

[1] All technical electives must be CAE or EG courses at the 400-level or above.

All architectural engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois multiple times during the year. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Bachelor of Science in Architectural Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 100	2	CAE 101	2
CAE 110	1	CAE 111	1
CAE 105	3	CS 104 or 105	2
CHEM 124	4	PHYS 123	4
MATH 151	5	MATH 152	5
Humanities 200-level Course	3	Social Sciences Elective	3
	18		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 208	3	CAE 209	3
CAE 286	3	CAE 287	3
PHYS 221	4	CAE 312	3
MATH 251	4	MATH 252	4
AAH 119	3	Social Sciences Elective (300+)	3
	17		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 303	3	CAE 307	3
CAE 304	3	CAE 323	3
CAE 315	3	CAE 464	3
CAE 331	3	IPRO Elective II	3
CAE 383	3	Humanities Elective (300+)	3
IPRO Elective I	3		
	18		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 461	3	CAE 471	3
CAE 468	3	CAE 495	3
CAE 470	3	CAE Technical Elective[1]	3
CAE Technical Elective[1]	3	CAE Technical Elective[1]	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	15		15

Total Credit Hours: 131

1 All technical electives must be CAE or EG courses at the 400-level or above.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

All architectural engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois multiple times during the year. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Professional Specializations in Architectural Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the following technical electives listed under the respective area of specialization. Other 400- or 500-level courses may be used towards a specialization with the prior approval of the student's adviser.

Building Electrical and Lighting

Code	Title	Credit Hours
CAE 465	Bldg Energy Conserve Techlgys	3
CAE 466	Building Electrical Systs Dsgn	3
CAE 467	Lighting Systems Design	3

Building Mechanical and Energy

Code	Title		Credit Hours
Select a minimum of nine credit hours from the following courses:			9
CAE 463	Building Enclosure Design	3	
CAE 465	Bldg Energy Conserve Techlgys	3	
CAE 515	BIM Applications for Bldg Perf	3	
CAE 550	Applied Bldg Energy Modeling	3	
CAE 556	Net Zero Energy Home Dsgn I	3	
CAE 557	Net Zero Energy Home Dsgn II	3	

Construction and Engineering Management

Code	Title	Credit Hours
CAE 472	Construction Site Operation	3
CAE 473	Construction Contract Admin	3
EG 430	Intro Building Info Modeling	3

Fire Protection and Life Safety

Code	Title	Credit Hours
CAE 422	Sprinklers Standpipes Fire Pum	3
CAE 424	Intro Fire Dynamics	3
CAE 425	Fire Protection & Life Safety	3

Structural Engineering

Code	Title	Credit Hours
CAE 411	Structural Analysis II	3
CAE 431	Steel Design	3
CAE 432	Concrete and Foundation Design	3

Bachelor of Science in Civil Engineering

The objective of the civil engineering program is to prepare graduates to enter and be successful in the civil engineering profession. Graduates are expected to become licensed professional engineers, and to reach responsible positions in a wide range of professional settings, including consulting firms, industry, or government. This program will prepare students to begin and successfully complete graduate studies in engineering and/or post-baccalaureate education in a professional degree program. The civil engineering program provides breadth in core sub-disciplines and depth in at least one area of specialization.This degree program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Civil engineering is the original of the engineering disciplines. With the increase in population, the growing complexity of industries, and changing urban centers, the civil engineer's task—applying science to the control and utilization of the environment for the total benefit of mankind—represents a challenge unsurpassed in all of engineering.

The civil engineer often is confronted with conditions so variable and complex that they cannot be precisely defined by science and mathematics. Therefore, a knowledge of the arts and social sciences, as well as the physical sciences, is essential. In addition, because civil engineering requires overall planning of very large projects whose components involve many other disciplines, it is also necessary to have knowledge of management techniques. The goal of the civil engineering program is to provide an education that enables graduates to make far-reaching decisions that draw not only from technical knowledge but also from integrity and judgment.

In the professional courses, classroom lectures are supplemented by laboratory practice, including the study of materials, structural engineering, hydraulics, environmental engineering, geotechnical engineering, and surveying. The principal functional areas that are considered sub-divisions of civil engineering are structural engineering, transportation engineering, geotechnical engineering, environmental engineering, water resources engineering, and construction management.

Students may choose a professional specialization as described on the following pages, or one of the following minors: Air Force Aerospace Studies, Military Science, Naval Science, and other approved minors (p. 26).

Architecture students who plan to pursue a Master of Engineering in Structural Engineering degree should take the following courses:

CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 307	Structural Design II	3
CAE 431	Steel Design	3
CAE 432	Concrete and Foundation Design	3

Students should consult the Master of Engineering in Structural Engineering curriculum for additional details.

Required Courses

Code	Title	Credit Hours
Civil Engineering Requirements		**(42)**
CAE 100	Intro to Engg Drawing & Design	2
CAE 101	Intro to AutoCAD Draw Design	2
CAE 105	Geodetic Science	3
CAE 110	Professional Practice I	1
CAE 111	Professional Practice II	1
CAE 302	Fluid Mechanics and Hydraulics	3
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 307	Structural Design II	3
CAE 315	Materials of Construction	3
CAE 323	Intro to Geotechnical Engineer	3
CAE 419	Intro Transportation Engg/Dsgn	3
CAE 431	Steel Design	3
CAE 432	Concrete and Foundation Design	3
CAE 457	Geotechnical Foundation Dsgn	3
CAE 470	Constrctn Methods&Cost Estmg	3
CAE Technical Electives		**(12)**
Select 12 credit hours. [1]		12

CAE Additional Science Requirement		**(3)**
CAE 221	Engineering Geology	3
Mathematics Requirements		**(21)**
CAE 312	Engineering Systems Analysis	3
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Capstone Design Requirement		**(3)**
CAE 495	Capstone Senior Design	3
Chemistry Requirement		**(4)**
CHEM 124	Princ of Chemistry I with Lab	4
Computer Science Requirement		**(2)**
CS 104	Intro to Comp Prgrm for Engrs	2
or CS 105	Intro to Computer Programming	
Engineering Course Requirements		**(9)**
CAE 286	Theory&Concpt of Struct Mechcs	3
CAE 287	Mechanics Structural Materials	3
MMAE 305	Dynamics	3
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Total Credit Hours		131

[1] All technical electives must be CAE or EG courses at the 400-level or above.

All civil engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois multiple times during the year. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Bachelor of Science in Civil Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 100	2	CAE 101	2
CAE 110	1	CAE 111	1
CAE 105	3	MATH 152	5
MATH 151	5	CS 104 or 105	2
CHEM 124	4	PHYS 123	4
Humanities 200-level Course	3	Social Sciences Elective	3
	18		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 251	4	MATH 252	4
CAE 286	3	MMAE 305	3
CAE 221	3	CAE 287	3
PHYS 221	4	CAE 312	3
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	17		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 302	3	CAE 307	3
CAE 303	3	CAE 323	3
CAE 304	3	CAE Technical Elective[1]	3
CAE 315	3	IPRO Elective II	3
IPRO Elective I	3	Social Sciences Elective (300+)	3
	15		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 419	3	CAE 432	3
CAE 431	3	CAE 495	3
CAE 457	3	CAE Technical Elective[1]	3
CAE 470	3	CAE Technical Elective[1]	3
CAE Technical Elective[1]	3	Social Sciences Elective (300+)	3
Humanities Elective (300+)	3		
	18		15

Total Credit Hours: 131

1 All technical electives must be CAE or EG courses at the 400-level or above.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

All civil engineering students are required to take the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the State of Illinois multiple times during the year. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Professional Specializations in Civil Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the following technical electives listed under the respective area of specialization.

Three additional credit hours may be any 400-level CAE course taken with prior approval of the student's adviser and chair.

Civil-Environmental Engineering

Code	Title		Credit Hours
Select a minimum of three courses from the following:			9
CHE 426	Statistical Tools Engineers	3	
ENVE 310	Intro Environmental Enginrng	3	
ENVE 404	Water & Wastewater Engineering	3	
ENVE 463	Intro Air Pollution Control	3	
Total Credit Hours			9

Construction Engineering and Management

Code	Title	Credit Hours
CAE 471	Construction Plan & Scheduling	3
CAE 472	Construction Site Operation	3
CAE 473	Construction Contract Admin	3
Total Credit Hours		9

Geotechnical Engineering

Code	Title	Credit Hours
CAE 401	Hydraulics, Hydrology, & Appl	3
CAE 415	Pavement Design	4
CAE 486	Soil Site Improvement	3
Total Credit Hours		10

Structural Engineering

Code	Title		Credit Hours
CAE 411	Structural Analysis II		3
Select a minimum of two courses from the following:			6
CAE 408	Bridge Structural Design	3	
CAE 410	Intro to Wind/Earthquake Engg	3	
CAE 435	Experimental Anlys Structures	3	
CAE 436	Dsgn Masonry/Timber Structures	3	
CAE 437	Homeland Security Concerns	3	
Other 400- or 500-level courses may be used towards the specialization with the prior approval of the student's adviser.		3	
Total Credit Hours			9

Transportation Engineering

Code	Title		Credit Hours
Select a minimum of three courses from the following:			9
CAE 412	Traffic Engrg Studies Design	3	
CAE 415	Pavement Design	4	
CAE 416	Faclty Dsgn Trnsprtn Syst	3	
CAE 417	Railroad Engineering & Design	3	
CAE 430	Probability Cncpt Ce Dsgn	3	
Total Credit Hours			9

Bachelor of Science in Engineering Management

The engineering management program at Illinois Institute of Technology is founded on the tradition of discipline and innovation established by the Armour College of Engineering.

The program offers an opportunity for students to obtain skills and competencies that are highly relevant and driven by the accelerating development of new technologies in the emerging global economy at the intersection of engineering invention and business administration.

The program's objective is to prepare students to become leaders in the corporate world shaped by innovations in engineering. Students learn fundamentals of science, engineering management, and business administration by concentrating on the development of critical thinking skills directed toward practical problem solving and informed decision making.

Students completing this program are uniquely positioned to make decisions concerning product process development in ways that combine technical, financial, marketing, human resources, and strategic considerations. Students are prepared to perform economic analyses for new products, evaluate technologies, and assess business processes. Students completing this program will be able to prepare business plans that include financial details, marketing strategies, and design decisions based on target costs and forecasted rate of return on investment capital.

Students have several possibilities to specialize in engineering disciplines. Specializations include: civil engineering, architectural engineering, materials science and engineering, and mechanical engineering, among others.

The program also includes a business curriculum that focuses on developing organization and management, critical thinking, and entrepreneurship skills.

Required Courses

Code	Title		Credit Hours
Mathematics/Computer Science Requirements			**(20)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
CS 104	Intro to Comp Prgrm for Engrs		2
or CS 105	Intro to Computer Programming		
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
Chemistry Requirement			**(3-4)**
Select three to four credit hours			3-4
Introduction to the Profession			**(2)**
Select an Introduction to the Profession course			2
Core Engineering Specialization			**(28)**
Select a minimum of 28 credit hours [1]			28
Core Entrepreneurship Requirements			**(24)**
BUS 211	Financial Accounting		3
BUS 212	Managerial Accounting		3
BUS 301	Organizational Behavior		3
BUS 371	Marketing Fundamentals		3
Select a minimum of four courses from the following:			12
BUS 305	Operation and Supply Chain Des	3	
BUS 361	Entrepreneurship I	3	
CAE 312	Engineering Systems Analysis (for non-CAEE specializations)	3	
COM 421	Technical Communication	3	
COM 428	Verbal Visual Communications	3	
ECON 423	Econ Anal Capital Investments	3	
EMGT 363	Creativity/Inventions/Entrepre	3	
EMGT 406	Entrepreneurship & IP Mgmt	3	

EMGT 470	Project Management	3	
INTM 404	Marketing, Sales, & Prod Intro	3	
INTM 477	Entrepreneurship Industry	3	
MMAE 232	Design for Innovation (for non-MMAE specializations)	3	
Core Engineering or Entrepreneurship Technical Electives			**(9)**
Select nine credit hours			9
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
ECON 211	Principles of Economics (recommended)	3	
Free Electives			**(6)**
Select six credit hours			6
Total Credit Hours			127-128

1 Individual department requirements may vary.

Engineering Management Specializations

Specializations include those listed below. See engineering.iit.edu/caee for additional engineering specializations.

Aerospace Engineering

Code	Title	Credit Hours
MMAE 200	Statics	3
MMAE 202	Mechanics of Solids	3
MMAE 304	Mechanics of Aerostructures	3
MMAE 311	Compressible Flow	3
MMAE 312	Aerodynamics of Aerospace VHLS	3
MMAE 313	Fluid Mechanics	3
MMAE 315	Aerospace Laboratory I	4
MMAE 320	Thermodynamics	3
MS 201	Materials Science	3

Architectural Engineering

Code	Title	Credit Hours
CAE 100	Intro to Engg Drawing & Design	2
CAE 101	Intro to AutoCAD Draw Design	2
CAE 208	Thermal-Fluids Engineering I	3
CAE 209	Thermal-Fluids Engineering II	3
CAE 286	Theory&Concpt of Struct Mechcs	3
CAE 287	Mechanics Structural Materials	3
CAE 312	Engineering Systems Analysis	3
CAE 331	Building Science	3
CAE 383	Electrical Electronic Circuits	3
or CAE 464	HVAC Systems Design	
CAE 461	Plumbing/Fire Protection Dsgn	3

Biomedical Engineering: Cell and Tissue Track

Code	Title	Credit Hours
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
BME 301	Bio Fluid Mechanics	3
BME 309	Biomedical Imaging	3
BME 310	Biomaterials	3
BME 315	Instrumentation Laboratory	1
BME 330	Anlys of Biosignals and Systs	3
CAE 383	Electrical Electronic Circuits	3
or ECE 211	Circuit Analysis I	
CHE 202	Material Energy Balances	3
CHEM 125	Prin of Chemistry II w/Lab	4
MMAE 200	Statics	3

Biomedical Engineering: Medical Imaging Track

Code	Title	Credit Hours
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
BME 309	Biomedical Imaging	3
BME 310	Biomaterials	3
BME 315	Instrumentation Laboratory	1
BME 330	Anlys of Biosignals and Systs	3
CHEM 125	Prin of Chemistry II w/Lab	4
CS 201	Accelerated Intro to Cmptr Sci	4
ECE 211	Circuit Analysis I	3
PHYS 224	Gen Physics III for Engnrs	3-4
or CHEM 237	Organic Chemistry I	

Biomedical Engineering: Neural Engineering Track

Code	Title	Credit Hours
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
BME 309	Biomedical Imaging	3
BME 315	Instrumentation Laboratory	1
BME 330	Anlys of Biosignals and Systs	3
CHEM 125	Prin of Chemistry II w/Lab	4
CHEM 237	Organic Chemistry I	4
ECE 211	Circuit Analysis I	3
ECE 216	Circuit Analysis II	3
ECE 218	Digital Systems	4

Chemical Engineering

Code	Title	Credit Hours
CHE 101	Intro to the Profession II	2
CHE 202	Material Energy Balances	3
CHE 301	Fluid Mechanics	3
CHE 302	Heat Mass Trnsfr Operations	3
CHE 351	Thermodynamics I	3
CHE 451	Thermodynamics II	3
CHEM 125	Prin of Chemistry II w/Lab	4
CHEM 237	Organic Chemistry I	4

CHEM 239	Organic Chemistry II	3
CHEM 343	Physical Chemistry I	3

Civil Engineering

Code	Title	Credit Hours
CAE 100	Intro to Engg Drawing & Design	2
CAE 101	Intro to AutoCAD Draw Design	2
CAE 286	Theory&Concpt of Struct Mechcs	3
CAE 287	Mechanics Structural Materials	3
CAE 302	Fluid Mechanics and Hydraulics	3
CAE 303	Structural Design I	3
or CAE 304	Structural Analysis I	
CAE 312	Engineering Systems Analysis	3
CAE 315	Materials of Construction	3
CAE 323	Intro to Geotechnical Engineer	3
MMAE 305	Dynamics	3

Computer Engineering

Code	Title	Credit Hours
CS 116	Object-Oriented Programming II	2
CS 331	Data Structures and Algorithms	3
ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 218	Digital Systems	4
ECE 242	Digital Computers&Computing	3
ECE 307	Electrodynamics	4
ECE 308	Signals Systems	3
ECE 311	Engineering Electronics	4

Computer Science

Code	Title	Credit Hours
CS 116	Object-Oriented Programming II	2
CS 330	Discrete Structures	3
or MATH 230	Introduction to Discrete Math	
CS 331	Data Structures and Algorithms	3
CS 350	Cmptr Org&Asmbly Lang Prgmmg	3
CS 351	Systems Programming	3
CS 425	Database Organization	3
CS 430	Introduction to Algorithms	3
CS 440	Prgmng Languages Translators	3
MATH 332	Elementary Linear Algebra	3
or MATH 333	Matrix Alg & Complex Variables	
MATH 474	Probability and Statistics	3
or MATH 475	Probability	

Electrical Engineering

Code	Title	Credit Hours
CS 116	Object-Oriented Programming II	2
ECE 211	Circuit Analysis I	3
ECE 213	Circuit Analysis II	4
ECE 218	Digital Systems	4
ECE 307	Electrodynamics	4
ECE 308	Signals Systems	3
ECE 311	Engineering Electronics	4
MATH 333	Matrix Alg & Complex Variables	3
MATH 374	Probability/Statistics for ECE	3

Materials Science and Engineering

Code	Title		Credit Hours
MMAE 200	Statics		3
MMAE 202	Mechanics of Solids		3
MMAE 232	Design for Innovation		3
MMAE 320	Thermodynamics		3
MMAE 365	Strctr & Propts of Materials I		3
MMAE 370	Materials Laboratory I		3
MMAE 463	Strctr&Propts of Mtrl II		3
MS 201	Materials Science		3
Select two courses from the following:			6
MMAE 372	Aerospace Materials Lab	3	
MMAE 470	Intro to Polymer Science	3	
MMAE 476	Materials Laboratory II	3	
MMAE 485	Manufacturing Processes	3	

Mechanical Engineering

Code	Title	Credit Hours
MMAE 200	Statics	3
MMAE 202	Mechanics of Solids	3
MMAE 232	Design for Innovation	3
MMAE 313	Fluid Mechanics	3
MMAE 315	Aerospace Laboratory I	4
or MMAE 319	Mechanical Laboratory I	
MMAE 320	Thermodynamics	3
MS 201	Materials Science	3
Two MMAE electives		6

Minor in Building Systems Engineering

Required Courses

Code	Title		Credit Hours
CAE 331	Building Science		3
CAE 461	Plumbing/Fire Protection Dsgn		3
CAE 464	HVAC Systems Design		3
Select a minimum of two courses from the following:			6
CAE 424	Intro Fire Dynamics	3	
CAE 425	Fire Protection & Life Safety	3	
CAE 463	Building Enclosure Design	3	
CAE 465	Bldg Energy Conserve Techlgys	3	
CAE 466	Building Electrical Systs Dsgn	3	
CAE 467	Lighting Systems Design	3	
Total Credit Hours			15

Minor in Construction Management

Required Courses

Code	Title	Credit Hours
CAE 470	Constrctn Methods&Cost Estmg	3
CAE 471	Construction Plan & Scheduling	3
CAE 472	Construction Site Operation	3
CAE 473	Construction Contract Admin	3
ECON 423	Econ Anal Capital Investments	3
Total Credit Hours		15

Minor in Engineering Graphics and CAD

Required Courses

Code	Title	Credit Hours
CAE 100	Intro to Engg Drawing & Design	2
CAE 101	Intro to AutoCAD Draw Design	2
EG 305	Advanced Engr Graphic&Design	3
EG 306	Engr Descriptive Geometry	3
EG 405	Mechanical Dsgn Graphics	3
EG 406	Technical & Pictorial Illust	3
EG 419	Computer Graphics in Engnr	3
Total Credit Hours		19

Minor in Environmental Engineering

Required Courses

Code	Title		Credit Hours
Select six to nine credit hours from the following:			6-9
ENVE 404	Water & Wastewater Engineering	3	
ENVE 463	Intro Air Pollution Control	3	
ENVE 485	Industrial Ecology	3	
Select six to nine credit hours from the following:			6-9
CAE 421	Risk Assessment Engrg	3	
CAE 439	Intro Geographic Info Syst	3	
CAE 465	Bldg Energy Conserve Techlgys	3	
CAE 482	Hydraulic Dsgn Open Chnnl Syst	3	

Appropriate substitutions may be made with the approval of the minor adviser.

Minor in Graphics and CAD for Non-Engineers

Required Courses

Code	Title	Credit Hours
EG 225	Eng Graphics for Non-Engineers	3
EG 325	Adv Engg Graphics Non-Engineer	3
EG 329	Graphic Reprsntn Non Engineers	3
EG 425	Cmptr Gphs for Non Engrs	3
EG 429	Cmptr Graphic for Desktop Pbls	3
Total Credit Hours		15

Minor in Structural Engineering

Required Courses - Architecture Majors only

Code	Title	Credit Hours
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 307	Structural Design II	3
CAE 431	Steel Design	3
CAE 432	Concrete and Foundation Design	3
Total Credit Hours		15

This minor is usually taken in conjunction with the Bachelor of Architecture/Master of Civil Engineering dual degree program. (p. 27)

Required Courses - Non-CAEE, Non-ARCH Majors only

Code	Title	Credit Hours
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 307	Structural Design II	3
CAE 315	Materials of Construction	3
CAE 431	Steel Design	3
Total Credit Hours		15

Minor in Transportation Engineering

Required Courses

Code	Title	Credit Hours
CAE 412	Traffic Engrg Studies Design	3
CAE 415	Pavement Design	4
CAE 416	Faclty Dsgn Trnsprtn Syst	3
CAE 417	Railroad Engineering & Design	3
CAE 430	Probability Cncpt Ce Dsgn	3
Total Credit Hours		16

Appropriate substitutions may be made with the approval of the minor adviser.

Electrical and Computer Engineering

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Chair
Jafar Saniie

Faculty with Research Interests
For information regarding faculty visit the Department of Electrical and Computer Engineering website.

The Department of Electrical and Computer Engineering offers a Bachelor of Science in Electrical Engineering (B.S.E.E.). The department also offers a Bachelor of Science in Computer Engineering (B.S.CP.E.). Both degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Minors in areas not listed below require approval from an academic adviser and department chair (for more details, see the Minors section (p. 26)).

- Air Force Aerospace Studies
- Applied Mathematics
- Business
- Energy/Environment/Economics (E3)
- Military Science
- Naval Science
- Premedical Studies
- Telecommunications

The B.S.E.E. curriculum provides a strong foundation in mathematics, physics, chemistry, and computer science during the first two years of study. The fundamentals of circuits, electronics, digital and computer systems, electrodynamics, linear systems, and energy conversion are introduced in the second and third years. In the senior year, students further explore their specific areas of interest and gain in-depth exposure to engineering design through the choice of elective courses.

The B.S.CP.E. curriculum concentrates on the design and application of computer hardware and software systems. During the first three years, the curriculum provides students with a strong foundation in mathematics, physics, chemistry, and computer science, followed by the fundamentals of electrical engineering and computer science that form the basis of computer engineering. During the senior year, advanced courses provide students with depth in selected areas and exposure to the practice of engineering design. Elective courses provide the flexibility to take specialized courses in a number of different areas.

Students with strong interests in both electrical engineering and computer engineering can elect to earn a dual degree, B.S.E.E./B.S.CP.E.

Degrees Offered

Co-Terminal Options

The Department of Electrical and Computer Engineering also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biomedical Engineering/Master of Biomedical Imaging and Signals
- Bachelor of Science in Computer Engineering/Master of Computer Science
- Bachelor of Science in Computer Engineering/Master of Science in Computer Science
- Bachelor of Science in Computer Engineering/Master of Science in Computer Engineering
- Bachelor of Science in Computer Engineering/Master of Science in Electrical Engineering
- Bachelor of Science in Electrical Engineering/Master of Science in Computer Engineering
- Bachelor of Science in Electrical Engineering/Master of Science in Electrical Engineering

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Electrical and Computer Engineering website (engineering.iit.edu/ece).

Minors

- Minor in Circuits and Systems (p. 94)
- Minor in Telecommunications (p. 94)

Bachelor of Science in Computer and Cybersecurity Engineering

The Bachelor of Science in Computer and Cybersecurity Engineering (CCSE) is a degree program that prepares students for an engineering career that involves design and application of secure and resilient computer hardware and software systems. This is a unique program that combines computer engineering and cybersecurity topics into one major. The program emphasizes the cybersecurity engineering of cyber-physical systems which are becoming more prevalent every day. It is concerned with detection and elimination of vulnerabilities and the safe operation of the Internet of Things, cloud computing, healthcare, smart/micro grid power systems, computer networks, and wireless communications.

Required Courses

Code	Title		Credit Hours
Computer and Cyber Security Engineering Requirements			**(47)**
ECE 100	Intro to the Profession I		3
ECE 211	Circuit Analysis I		3
ECE 213	Circuit Analysis II		4
ECE 218	Digital Systems		4
ECE 242	Digital Computers&Computing		3
ECE 308	Signals Systems		3
ECE 311	Engineering Electronics		4
ECE 407	Intro Comp Ntwks with Lab		4
ECE 441	Microcomputers/Embedded Comp		4
ECE 442	Internet of Things/Cyber Phys		3
ECE 443	Intro Computer Cyber Security		3
or CS 458	Intro to Information Security		
ECE 444	Computer Network Security		3
ECE 485	Computer Organization & Design		3
or CS 470	Computer Architecture		
ECE 497	Special Problems [1]		3
Computer Science Major Requirements			**(16)**
CS 115	Object-Oriented Programming I		2
CS 116	Object-Oriented Programming II		2
CS 330	Discrete Structures		3
CS 331	Data Structures and Algorithms		3
CS 351	Systems Programming		3
CS 450	Operating Systems		3
Software Engineering/Law Elective			**(2-3)**
Select two to three credit hours from the following courses:			2-3
LAW 252	Law of Privacy	3	
LAW 285	Cyber Fraud-Priv Class Actions	2	
LAW 295	Data Privacy and Security	2	
LAW 478	Computer & Network Privacy	3	
Mathematics Requirements			**(24)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
MATH 333	Matrix Alg & Complex Variables		3
MATH 374	Probability/Statistics for ECE		3
Physics Requirements			**(11)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 224	Gen Physics III for Engnrs		3
Chemistry Requirement			**(3)**
CHEM 122	Principles of Chem I w/out Lab		3

Science Elective			**(3)**
Select one of the following:			3
BIOL 105	Introduction to Biology	3	
BIOL 114	Introduction to Human Biology	3	
CHEM 126	Principles Chemistry II	3	
MS 201	Materials Science	3	
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Total Credit Hours			133-134

Minimum degree credits required: 133

1 ECE 497 with a project related to cyber security topics such as smart grid, Internet of Things, cloud computing, hardware security, or cryptography. Please see your academic adviser for more details.

Bachelor of Science in Computer and Cybersecurity Engineering Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ECE 100	3	MATH 152	5
MATH 151	5	PHYS 123	4
CHEM 122	3	CS 116	2
CS 115	2	Social Sciences Elective	3
Humanities 200-level Course	3	Science Elective[1]	3
	16		17
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
MATH 252	4	MATH 251	4
PHYS 221	4	PHYS 224	3
ECE 211	3	ECE 213	4
ECE 218	4	ECE 242	3
CS 331	3	CS 330	3
	18		17
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ECE 308	3	CS 450	3
ECE 311	4	ECE 407	4
CS 351	3	MATH 374	3
MATH 333 or 350	3	IPRO Elective I	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	16		16
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ECE 441	4	ECE 442	3
ECE 485 or CS 470	3	ECE 444	3
ECE 443 or CS 458	3	ECE 497[2]	3
IPRO Elective II	3	Cyber Security Law Elective[3]	2-3
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
		Social Sciences Elective (300+)	3
	16		17-18

Total Credit Hours: 133-134

1. Science elective must be BIOL 105, BIOL 114, CHEM 126, or MS 201.
2. ECE 497 with a project related to cyber security topics such as smart grid, Internet of Things, cloud computing, hardware security, or cryptography. Please see your academic adviser for more details.
3. Choose from the following courses: LAW 252, LAW 285, LAW 295, or LAW 478.

Bachelor of Science in Computer Engineering

Computer engineering involves the design and application of computer hardware and computer software. Computer hardware consists of the physical components that implement a computer system: processor and memory chips, circuit boards, and peripheral devices. Computer software consists of computer programs that accomplish a specific task using sequences of simple, programmable steps. Computers have become an integral part of many large systems that require sophisticated control, including automobiles, medical instrumentation, telecommunication systems, and factory automation. Computers are a driving force behind many of today's exciting new technologies, including wireless communications, interactive multimedia, and high-speed computer networks. Computer engineers must have detailed knowledge of both hardware and software to design, build, and use complex information processing systems for a wide range of applications.

The objectives of the ECE undergraduate computer engineering program are to produce electrical engineering graduates who are prepared to:

- Enter their profession and make intellectual contributions to it
- Embark on a lifelong career of personal and professional growth
- Take advanced courses at the graduate level

Required Courses

Code	Title		Credit Hours
Electrical Engineering Requirements			**(28)**
ECE 100	Intro to the Profession I		3
ECE 211	Circuit Analysis I		3
ECE 213	Circuit Analysis II		4
ECE 218	Digital Systems		4
ECE 242	Digital Computers&Computing		3
ECE 311	Engineering Electronics		4
ECE 441	Microcomputers/Embedded Comp		4
ECE 485	Computer Organization & Design		3
Computer Science Major Requirements			**(16)**
CS 115	Object-Oriented Programming I		2
CS 116	Object-Oriented Programming II		2
CS 330	Discrete Structures		3
CS 331	Data Structures and Algorithms		3
CS 351	Systems Programming		3
CS 450	Operating Systems		3
Junior Computer Engineering Elective			**(3-4)**
Select one of the following:			3-4
ECE 307	Electrodynamics	4	
ECE 308	Signals Systems	3	
ECE 319	Fndmntls of Power Engrn	4	
Professional ECE Electives			**(6-8)**
Select six to eight credit hours			6-8
Computer Systems/Software Elective			**(3-4)**
Select one of the following:			3-4
ECE 407	Intro Comp Ntwks with Lab	4	
ECE 408	Intro to Computer Ntwks	3	
ECE 443	Intro Computer Cyber Security	3	
ECE 449	Obj-Oriented Prog & Machine Le	3	
CS 425	Database Organization	3	
CS 487	Software Engineering	3	
Hardware-Design Elective			**(4)**
ECE 429	Intro to VLSI Design		4
or ECE 446	Advanced Logic Design		
Mathematics Requirements			**(24)**

MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
MATH 374	Probability/Statistics for ECE		3
MATH 333	Matrix Alg & Complex Variables		3
or MATH 350	Intro to Computational Mathe		
Physics Requirements			**(11)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 224	Gen Physics III for Engnrs		3
Chemistry Requirement			**(3)**
CHEM 122	Principles of Chem I w/out Lab		3
Engineering Science Requirement			**(3)**
MMAE 200	Statics		3
or MMAE 320	Thermodynamics		
Science Elective			**(3)**
Select one of the following:			3
BIOL 105	Introduction to Biology	3	
BIOL 114	Introduction to Human Biology	3	
CHEM 126	Principles Chemistry II	3	
MS 201	Materials Science	3	
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Total Credit Hours			131-135

Bachelor of Science in Computer Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 100	3	MATH 152	5
MATH 151	5	PHYS 123	4
CHEM 122	3	CS 116	2
CS 115	2	Social Sciences Elective	3
Humanities 200-level Course	3	Science Elective[1]	3
	16		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 252	4	MATH 251	4
PHYS 221	4	PHYS 224	3
ECE 211	3	ECE 213	4
ECE 218	4	ECE 242	3
CS 331	3	CS 330	3
	18		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 311	4	CS 450	3
CS 351	3	MATH 374	3
MMAE 200 or 320	3	Junior CPE Elective[2]	3-4
MATH 333 or 350	3	IPRO Elective I	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	16		15-16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 441	4	IPRO Elective II	3
ECE 485[3]	3	Professional ECE Elective[5]	3-4
Computer Systems/Software Elective[4]	3-4	ECE 429 or 446	4
Professional ECE Elective[5]	3-4	Humanities Elective (300+)	3
Humanities or Social Sciences Elective	3	Social Sciences Elective (300+)	3
	16-18		16-17

Total Credit Hours: 131-135

1. Science elective must be BIOL 105, BIOL 114, CHEM 126, or MS 201.
2. Junior CPE elective: Choose one of ECE 307, ECE 308, or ECE 319.
3. CS 470 may be substituted with adviser approval.
4. Computer systems/software elective: Choose one of ECE 407, ECE 408, ECE 443, ECE 449, CS 425, or CS 487.
5. Professional electives may be chosen from the 400-level ECE courses identified with a (P) in the course descriptions, and any 400-level computer science courses except CS 485. A maximum of three credit hours of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as a professional elective with adviser approval.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Electrical Engineering

Electrical engineering is concerned with the generation, transmission, and utilization of electrical energy and with the transmitting and processing of information. Electrical engineers are involved in the analysis, design, and production of electric power, radio, radar, television, computing, telecommunication, control, and information systems. These engineers find solutions to the challenging technical problems that arise in our rapidly changing society. They impact virtually every aspect of daily life, as evidenced by examples such as wireless communications, audio and video equipment, power distribution, computerized traffic control, noise pollution monitoring and abatement, and medical instrumentation.

The electrical engineering curriculum puts emphasis on both theory and practical applications by providing a solid background in engineering science and mathematics, followed by a sequence of core courses in electrical engineering. Design skills are fostered in the professional elective courses in the senior year, along with the project experience instilled by Interprofessional Projects (IPROs).

The objectives of the ECE undergraduate electrical engineering program are to produce electrical engineering graduates who are prepared to:

- Enter their profession and make intellectual contributions to it
- Embark on a lifelong career of personal and professional growth
- Take advanced courses at the graduate level

Required Courses

Code	Title		Credit Hours
Electrical Engineering Requirements			**(32)**
ECE 100	Intro to the Profession I		3
ECE 211	Circuit Analysis I		3
ECE 213	Circuit Analysis II		4
ECE 218	Digital Systems		4
ECE 242	Digital Computers&Computing		3
ECE 307	Electrodynamics		4
ECE 308	Signals Systems		3
ECE 311	Engineering Electronics		4
ECE 319	Fndmntls of Power Engrn		4
Professional ECE Electives			**(17-20)**
Select 17-20 credit hours [1]			17-20
Mathematics Requirements			**(24)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
MATH 333	Matrix Alg & Complex Variables		3
MATH 374	Probability/Statistics for ECE		3
Physics Requirements			**(11)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 224	Gen Physics III for Engnrs		3
Chemistry Requirement			**(3)**
CHEM 122	Principles of Chem I w/out Lab		3
Engineering Science Requirement			**(3)**
MMAE 200	Statics		3
or MMAE 320	Thermodynamics		
Computer Science Requirements			**(4)**
CS 115	Object-Oriented Programming I		2
CS 116	Object-Oriented Programming II		2
Science Elective			**(3)**
Select one of the following:			3
BIOL 105	Introduction to Biology	3	

BIOL 114	Introduction to Human Biology	3	
CHEM 126	Principles Chemistry II	3	
MS 201	Materials Science	3	
Technical Elective			**(3)**
Select three credit hours [2]			3
Free Elective			**(3)**
Select three credit hours			3
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Total Credit Hours			130-133

1. Professional ECE electives may be chosen from any of the 400-level ECE courses identified with (P) in the course descriptions. Courses at the 500-level may be taken with the written consent of the instructor, faculty adviser, and the ECE department chair. At least two of the electives must contain laboratories. A maximum of three credit hours of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as professional ECE electives with adviser approval.
2. Adviser-approved course from engineering, science, mathematics, or computer science that is more advanced than the academic level of the student.

Bachelor of Science in Electrical Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 100	3	MATH 152	5
MATH 151	5	PHYS 123	4
CHEM 122	3	CS 116	2
CS 115	2	Science Elective[1]	3
Humanities 200-level Course	3	Social Sciences Elective	3
	16		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 252	4	MATH 251	4
PHYS 221	4	PHYS 224	3
ECE 211	3	ECE 213	4
ECE 218	4	ECE 242	3
		Social Sciences Elective (300+)	3
	15		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 333	3	ECE 308	3
ECE 307	4	ECE 319	4
ECE 311	4	MATH 374	3
IPRO Elective I	3	Social Sciences Elective (300+)	3
Humanities Elective (300+)	3	Free Elective	3
	17		16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
IPRO Elective II	3	Professional ECE Elective[2]	4
Professional ECE Elective[2]	4	Professional ECE Elective[2]	3-4
Professional ECE Elective[2]	3-4	Professional ECE Elective[2]	3-4
Technical Elective[3]	3	MMAE 200 or 320	3
Humanities Elective (300+)	3	Humanities or Social Sciences Elective	3
	16-17		16-18

Total Credit Hours: 130-133

1 Science elective must be BIOL 105, BIOL 114, CHEM 126, or MS 201.

2 Professional ECE electives may be chosen from any of the 400-level ECE courses identified with (P) in the course descriptions. Courses at the 500-level may be taken with the written consent of the instructor, faculty adviser, and the ECE department chair. At least two of the electives must contain laboratories. A maximum of three credit hours of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as professional ECE electives with adviser approval.

3 Adviser-approved course from engineering, science, mathematics, or computer science that is more advanced than the academic level of the student.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Electrical Engineering/Bachelor of Science in Computer Engineering

The dual degree, B.S.E.E./B.S.CP.E., combines all the essential elements of a broad-based, traditional B.S.E.E. degree with the modern and progressive aspects of a B.S.CP.E. degree. This program contributes to the foundation of the new millennium, where computer hardware and software are used in areas such as telecommunications, power electronics, digital signal processing, computer networks, and control systems. Freshmen entering the university with a significant number of Advanced Placement credits may be able to complete both degrees in four years.

Required Courses

Code	Title		Credit Hours
Electrical Engineering Requirements			**(39)**
ECE 100	Intro to the Profession I		3
ECE 211	Circuit Analysis I		3
ECE 213	Circuit Analysis II		4
ECE 218	Digital Systems		4
ECE 242	Digital Computers&Computing		3
ECE 307	Electrodynamics		4
ECE 308	Signals Systems		3
ECE 311	Engineering Electronics		4
ECE 319	Fndmntls of Power Engrn		4
ECE 441	Microcomputers/Embedded Comp		4
ECE 485	Computer Organization & Design		3
Computer Engineering Requirements			**(16)**
CS 115	Object-Oriented Programming I		2
CS 116	Object-Oriented Programming II		2
CS 330	Discrete Structures		3
CS 331	Data Structures and Algorithms		3
CS 351	Systems Programming		3
CS 450	Operating Systems		3
Professional ECE Electives			**(9-12)**
Select 9-12 credit hours			9-12
Computer Systems/Software Elective			**(3-4)**
Select one of the following:			3-4
ECE 407	Intro Comp Ntwks with Lab	4	
ECE 408	Intro to Computer Ntwks	3	
ECE 443	Intro Computer Cyber Security	3	
ECE 449	Obj-Orntd Cmptr Sim	3	
CS 425	Database Organization	3	
CS 487	Software Engineering	3	
Hardware-Design Elective			**(4)**
ECE 429	Intro to VLSI Design		4
or ECE 446	Advanced Logic Design		
Mathematics Requirements			**(24)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
MATH 333	Matrix Alg & Complex Variables		3
MATH 374	Probability/Statistics for ECE		3
Physics Requirements			**(11)**
PHYS 123	General Physics I: Mechanics		4

PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 224	Gen Physics III for Engnrs		3
Chemistry Requirement			**(3)**
CHEM 122	Principles of Chem I w/out Lab		3
Engineering Science Requirement			**(3)**
MMAE 200	Statics		3
or MMAE 320	Thermodynamics		
Science Elective			**(3)**
Select one of the following:			3
BIOL 105	Introduction to Biology	3	
BIOL 114	Introduction to Human Biology	3	
CHEM 126	Principles Chemistry II	3	
MS 201	Materials Science	3	
Free Elective			**(3)**
Select three credit hours			3
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6

Minimum degree credits required: 146

Bachelor of Science in Electrical Engineering/Bachelor of Science in Computer Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 100	3	MATH 152	5
MATH 151	5	PHYS 123	4
CHEM 122	3	CS 116	2
CS 115	2	Science Elective[1]	3
Humanities 200-level Course	3	Social Sciences Elective	3
	16		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 252	4	MATH 251	4
PHYS 221	4	PHYS 224	3
ECE 211	3	ECE 213	4
ECE 218	4	ECE 242	3
CS 331	3	CS 330	3
	18		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 333	3	ECE 308	3
ECE 307	4	ECE 319	4
ECE 311	4	MMAE 200 or 320	3
IPRO Elective I	3	Social Sciences Elective (300+)	3
CS 351	3	Free Elective	3
	17		16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
ECE 441	4	ECE 485[2]	3
CS 450	3	Computer Systems/Software Elective[3]	3-4
MATH 374	3	ECE 429 or 446	4
IPRO Elective II	3	Professional ECE Elective[4]	3-4
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	16		16-18

Year 5

Semester 1	Credit Hours
Professional ECE Elective[4]	3-4
Professional ECE Elective[4]	3-4
Humanities Elective (300+)	3
Humanities or Social Sciences Elective	3
	12-14

Total Credit Hours: 145-149

[1] Science elective must be BIOL 105, BIOL 114, CHEM 126, or MS 201.
[2] CS 470 may be substituted with adviser approval.
[3] Computer systems/software elective: Choose one of ECE 407, ECE 408, ECE 443, ECE 449, CS 425, or CS 487.
[4] ECE 400-level course with (P) designation. A maximum of three credit hours of either ECE 491 or ECE 497.

Minor in Circuits and Systems

Required Courses - Non-Electrical Engineering, Non-Computer Engineering Majors only

Code	Title		Credit Hours
ECE 211	Circuit Analysis I		3
ECE 213	Circuit Analysis II		4
ECE 218	Digital Systems		4
Select one of the following course sequences:			6-7
ECE 308 & ECE 403	Signals Systems and Digital & Data Comm Systems	6	
ECE 308 & ECE 438	Signals Systems and Control Systems	6	
ECE 319 & ECE 418	Fndmntls of Power Engrn and Power Systems Analysis	7	
Total Credit Hours			17-18

Minor in Telecommunications

Required Courses

Code	Title		Credit Hours
CS 116	Object-Oriented Programming II		2
or CS 201	Accelerated Intro to Cmptr Sci		
ECE 403	Digital & Data Comm Systems		3
or ECE 405	Digital & Data Comm Syst w/Lab		
ECE 406	Intro to Wireless Comm Systems		3
or ECE 407	Intro Comp Ntwks with Lab		
ECE 437	Digital Signal Processing I		3
Select a minimum of two courses from the following:			6
CS 331	Data Structures and Algorithms	3	
CS 450	Operating Systems	3	
ECE 449	Obj-Orntd Cmptr Sim	3	
Total Credit Hours			17

Mechanical, Materials, and Aerospace Engineering

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Chair
Sumanta Acharya

Faculty with Research Interests
For information regarding faculty visit the Department of Mechanical, Materials, and Aerospace Engineering website.

The Department of Mechanical, Materials, and Aerospace Engineering offers the Bachelor of Science degree in Aerospace Engineering (AE), Materials Science and Engineering (MSE), and Mechanical Engineering (ME). These degree programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

The educational objectives of the Bachelor of Science in ME, AE, and MSE programs are:

- Graduates will meet the expectations of employers of ME/AE/MSEs
- Qualified graduates will be prepared to pursue advanced study if they so desire
- Graduates will be prepared to assume/undertake leadership roles in their communities and/or professions

The student outcomes of the (ME/AE/MSE) program are to develop in graduates:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Mechanical, Materials, and Aerospace Engineering

Students are introduced to the scope of the engineering profession in the first-semester course “Introduction to the Profession,” and also to the ethical, economical, safety, environmental, and other responsibilities of being a professional engineer. Strong emphasis is placed on development of oral and written communication skills. Accompanying courses in mathematics and the basic sciences provide the foundation for later studies of engineering sciences relevant to the students’ major fields of study. These areas include: energy, structures, and motion for the ME major; materials, structure-property relations, materials processing, service behavior, and design for the MSE major; and structures and materials, propulsion, and aerodynamics for the AE major. Regardless of the students’ intended major, all MMAE students have a common curriculum for the first two semesters.

The second year emphasizes building a foundation for the eventual study of engineering design. The engineering sciences offer a rational approach to solving detailed problems encountered in major-specific courses, including the IPROs and capstone design courses of the third and fourth years.

In the third year, students begin the transition to professional practice and learn to develop sound engineering judgment by studying open-ended problems and realistic constraints. Students build further on the engineering sciences, and approximately one-third of major-specific coursework is devoted to the introduction of tangible engineering design. The student’s professional experience is developed by participation in a minimum of two Interprofessional Projects (IPROs) in the third and fourth years.

The process continues into the fourth year where the three programs culminate in senior-year projects. Mechanical engineering projects involve design of thermal and mechanical systems; materials science and engineering students develop new or optimized materials, processing routes, or selection schemes; and aerospace engineering students produce conceptual designs of aircraft and spacecraft missions.

Advising

The MMAE department considers the advising of students an important obligation. Each student must meet with a faculty adviser during the advising period each semester. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements for ABET accreditation. Students' academic advisers can be found on their MyIIT portal (my.iit.edu) account.

Program requirements may not be waived, nor will substitutions be permitted, without the approval of the departmental undergraduate studies committee.

Taking a Course for Pass/Fail

Students majoring in Aerospace Engineering, Materials Science and Engineering, or Mechanical Engineering cannot take any required course for their major as Pass/Fail except for free elective courses. Any courses taken above and beyond the student's program requirements can also be taken as Pass/Fail.

Degree Programs

- Bachelor of Science in Aerospace Engineering (p. 98)
- Bachelor of Science in Materials Science and Engineering (p. 100)
- Bachelor of Science in Mechanical Engineering (p. 103)

Co-Terminal Options

The Department of Mechanical, Materials, and Aerospace Engineering also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Aerospace Engineering/Master of Engineering in Materials Science and Engineering
- Bachelor of Science in Aerospace Engineering/Master of Engineering in Mechanical and Aerospace Engineering
- Bachelor of Science in Materials Science and Engineering/Master of Engineering in Materials Science and Engineering
- Bachelor of Science in Mechanical Engineering/Master of Engineering in Materials Science and Engineering
- Bachelor of Science in Mechanical Engineering/Master of Engineering in Mechanical and Aerospace Engineering

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Mechanical, Materials, and Aerospace Engineering website (engineering.iit.edu/mmae).

Minors

Minors available to students who wish to broaden their knowledge can be found in the Minors section (p. 26). In all programs, required minor courses may substitute for free electives. In addition, required minor courses may also substitute for technical electives provided that the minor courses are approved technical elective courses. Minors other than those listed below may be undertaken with the approval of the student's faculty adviser and the MMAE undergraduate studies committee. In the event that a required course for a minor is also required for the major, an approved substitution must be made. Application to take a minor is typically made in the student's third or fourth semester. Minors require completion of additional courses.

Among the minors that are available to ME, MSE, and AE students are:

- Aerospace Science (for ME and MSE students only)
- Air Force Aerospace Studies
- Artificial Intelligence
- Business
- Construction Management
- Electromechanical Design and Manufacturing (for ME and AE students only)
- Energy/Environment/Economics (E3)
- Environmental Engineering
- Materials Science (for ME and AE students only)
- Military Science
- Naval Science
- Polymer Science and Engineering

- Premedical Studies
- Software Engineering

MMAE Minors

Bachelor of Science in Aerospace Engineering

Aerospace engineering explores both the design and manufacture of aircraft, as well as the design and flight of vehicles beyond the earth's atmosphere. Knowledge of aerodynamics, structures and materials, propulsion systems, and flight mechanics and controls are important to this field.

Aerospace engineers are primarily employed in civil aeronautics, the defense industry, and the space program. However, applications of aerospace technology are also found in related areas such as ground and undersea transportation systems, pollution control, wind power and the effects of wind on structures, and the development and use of advanced materials.

Required Courses

Code	Title	Credit Hours
Aerospace Engineering Requirements		**(59)**
MMAE 100	Intro to the Profession	3
MMAE 200	Statics	3
MMAE 202	Mechanics of Solids	3
MMAE 304	Mechanics of Aerostructures	3
MMAE 305	Dynamics	3
MMAE 311	Compressible Flow	3
MMAE 312	Aerodynamics of Aerospace VHLS	3
MMAE 313	Fluid Mechanics	3
MMAE 315	Aerospace Laboratory I	4
MMAE 320	Thermodynamics	3
MMAE 350	Computational Mechanics	3
MMAE 352	Aerospace Propulsion	3
MMAE 372	Aerospace Materials Lab	3
MMAE 410	Aircraft Flight Mechanics	3
MMAE 411	Spacecraft Dynamics	3
MMAE 412	Spacecraft Design I	3
MMAE 414	Aircraft Design I	3
MMAE 415	Aerospace Laboratory II	4
MMAE 443	Systems Analysis and Control	3
Materials Science Requirement		**(3)**
MS 201	Materials Science	3
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Chemistry Requirement		**(4)**
CHEM 124	Princ of Chemistry I with Lab	4
Computer Science Requirement		**(2)**
CS 104	Intro to Comp Prgrm for Engrs	2
Interprofessional Project (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Free Electives		**(6)**
Select six credit hours		6
Total Credit Hours		127

Bachelor of Science in Aerospace Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 100	3	MS 201	3
MATH 151	5	MATH 152	5
CHEM 124	4	PHYS 123	4
Humanities 200-level Course	3	CS 104	2
		Social Sciences Elective	3
	15		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 200	3	MMAE 202	3
MATH 251	4	MMAE 313	3
PHYS 221	4	MMAE 320	3
Humanities or Social Sciences Elective	3	MATH 252	4
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	17		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 311	3	MMAE 304	3
MMAE 312	3	MMAE 305	3
MMAE 315	4	MMAE 352	3
MMAE 350	3	MMAE 372	3
Free Elective	3	Humanities Elective (300+)	3
	16		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 410	3	MMAE 412	3
MMAE 411	3	MMAE 415	4
MMAE 414	3	IPRO Elective II	3
MMAE 443	3	Free Elective	3
IPRO Elective I	3	Social Sciences Elective (300+)	3
	15		16

Total Credit Hours: 127

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Materials Science and Engineering

The materials science and engineering program aims to develop an understanding of the structure, properties, processing, and service behavior of engineering materials, including metallic, ceramic, polymeric, and composite materials. This understanding fosters both development of new materials and improvement of existing materials in order to optimize manufactured products. Laboratory experience is an important part of the program and emphasizes microstructural characterization using modern analytical techniques, such as optical and electron microscopy and x-ray diffraction, materials processing, determination of the physical and mechanical behavior of materials, and materials and process selection.

Graduating students find employment opportunities in a wide range of industries requiring knowledge of materials development and/or optimization, processing, and selection.

Required Courses

Code	Title	Credit Hours
Materials Engineering Requirements		**(46)**
MMAE 100	Intro to the Profession	3
MMAE 200	Statics	3
MMAE 202	Mechanics of Solids	3
MMAE 232	Design for Innovation	3
MMAE 320	Thermodynamics	3
MMAE 365	Strctr & Propts of Materials I	3
MMAE 370	Materials Laboratory I	3
MMAE 372	Aerospace Materials Lab	3
MMAE 373	Instrumentation/Measuremnt Lab	4
MMAE 463	Strctr&Propts of Mtrl II	3
MMAE 465	Electrl,Mgntc & Optic	3
MMAE 470	Intro to Polymer Science	3
MMAE 472	Advanced Aerospace Materials	3
MMAE 476	Materials Laboratory II	3
MMAE 485	Manufacturing Processes	3
Materials Science Requirement		**(3)**
MS 201	Materials Science	3
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(11)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
PHYS 224	Gen Physics III for Engnrs	3
Chemistry Requirement		**(4)**
CHEM 124	Princ of Chemistry I with Lab	4
Computer Science Requirement		**(2)**
CS 104	Intro to Comp Prgrm for Engrs	2
Technical Electives		**(6)**
Select six credit hours [1]		6
Engineering Elective		**(3)**
Select three credit hours [2]		3
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Elective		**(6)**

Select six credit hours	6
Total Credit Hours	126

[1] A technical elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalent) or in mathematics, chemistry, physics, or computer science. However, not all such courses are acceptable as technical electives. Students should consult their faculty adviser for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written approval by the department.

[2] An engineering elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalents).

Bachelor of Science in Materials Science and Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 100	3	MS 201	3
MATH 151	5	MATH 152	5
CHEM 124	4	PHYS 123	4
Humanities 200-level Course	3	CS 104	2
		Social Sciences Elective	3
	15		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 200	3	MMAE 202	3
MMAE 232	3	MATH 252	4
MATH 251	4	PHYS 224	3
PHYS 221	4	Humanities Elective (300+)	3
Humanities or Social Sciences Elective	3	Free Elective	3
	17		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 320	3	MMAE 372	3
MMAE 365	3	MMAE 463	3
MMAE 370	3	MMAE 465	3
MMAE 373	4	Free Elective	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
	16		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 470	3	MMAE 472	3
MMAE 476	3	IPRO Elective II	3
MMAE 485	3	Technical Elective[1]	3
IPRO Elective I	3	Engineering Elective[2]	3
Technical Elective[1]	3	Social Sciences Elective (300+)	3
	15		15

Total Credit Hours: 126

1 A technical elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalent) or in mathematics, chemistry, physics, or computer science. However, not all such courses are acceptable as technical electives. Students should consult their faculty adviser for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written approval by the department.

2 An engineering elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalents).

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Bachelor of Science in Mechanical Engineering

Mechanical engineering is an essential part of most industries and modern technologies, and includes the analysis, design, and development of machines and structures that involve motion. Mechanical engineers are employed in areas such as the design and control of machinery; the development of means of transportation including automobiles, aircraft, space and marine vehicles, and railroads; computer-aided design and manufacture of products, consumer goods, devices, and industrial equipment; medical technology utilizing mechanical and electromechanical devices; the generation of energy from fossil and nuclear fuels; and the utilization, storage, and distribution of alternative energy sources.

Required Courses

Code	Title	Credit Hours
Mechanical Engineering Requirements		**(56)**
MMAE 100	Intro to the Profession	3
MMAE 200	Statics	3
MMAE 202	Mechanics of Solids	3
MMAE 232	Design for Innovation	3
MMAE 302	Advanced Mechanics of Solids	3
MMAE 305	Dynamics	3
MMAE 313	Fluid Mechanics	3
MMAE 319	Mechanical Laboratory I	4
MMAE 320	Thermodynamics	3
MMAE 321	Applied Thermodynamics	3
MMAE 323	Heat and Mass Transfer	3
MMAE 332	Design of Machine Elements	3
MMAE 350	Computational Mechanics	3
MMAE 419	Mechanical Laboratory II	4
MMAE 432	Design of Mechanical Systems	3
or MMAE 433	Design of Thermal Systems	
MMAE 443	Systems Analysis and Control	3
MMAE 445	Computer-Aided Design	3
MMAE 485	Manufacturing Processes	3
Materials Science Requirement		**(3)**
MS 201	Materials Science	3
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Chemistry Requirement		**(4)**
CHEM 124	Princ of Chemistry I with Lab	4
Computer Science Requirement		**(2)**
CS 104	Intro to Comp Prgrm for Engrs	2
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Technical Elective		**(3)**
Select three credit hours [1]		3
Free Electives		**(6)**

Select six credit hours	6
Total Credit Hours	127

[1] A technical elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalent) or in mathematics, chemistry, physics, or computer science. However, not all such courses are acceptable as technical electives. Students should consult their faculty adviser for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written approval by the department.

Bachelor of Science in Mechanical Engineering Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 100	3	MS 201	3
MATH 151	5	MATH 152	5
CHEM 124	4	PHYS 123	4
Humanities 200-level Course	3	CS 104	2
		Social Sciences Elective	3
	15		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 200	3	MMAE 202	3
MMAE 232	3	MMAE 350	3
MATH 251	4	MATH 252	4
PHYS 221	4	Humanities Elective (300+)	3
Humanities or Social Science Elective	3	Social Sciences Elective (300+)	3
	17		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 302	3	MMAE 319	4
MMAE 305	3	MMAE 321	3
MMAE 313	3	MMAE 323	3
MMAE 320	3	MMAE 332	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	15		16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
MMAE 419	4	MMAE 432 or 433	3
MMAE 443	3	Technical Elective[1]	3
MMAE 445	3	IPRO Elective II	3
MMAE 485	3	Free Elective	3
IPRO Elective I	3	Free Elective	3
	16		15

Total Credit Hours: 127

1 A technical elective is a 300- or higher-level course in any engineering discipline (other than required MMAE courses or their equivalent) or in mathematics, chemistry, physics, or computer science. However, not all such courses are acceptable as technical electives. Students should consult their faculty adviser for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written approval by the department.

This program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Minor in Aerospace Science

Required Courses - Materials Science Engineering Majors only

Code	Title		Credit Hours
MMAE 304	Mechanics of Aerostructures		3
MMAE 311	Compressible Flow		3
MMAE 312	Aerodynamics of Aerospace VHLS		3
MMAE 313	Fluid Mechanics		3
Select a minimum of one course from the following:			3
MMAE 350	Computational Mechanics	3	
MMAE 352	Aerospace Propulsion	3	
MMAE 410	Aircraft Flight Mechanics	3	
or MMAE 411	Spacecraft Dynamics		
MMAE 443	Systems Analysis and Control	3	
Total Credit Hours			15

Required Courses - Mechanical Engineering Majors only

Code	Title		Credit Hours
MMAE 311	Compressible Flow		3
MMAE 312	Aerodynamics of Aerospace VHLS		3
MMAE 352	Aerospace Propulsion		3
Select one course from each of the following groups of courses:			6
MMAE 410	Aircraft Flight Mechanics	3	
or MMAE 411	Spacecraft Dynamics		
MMAE 412	Spacecraft Design I	3	
or MMAE 414	Aircraft Design I		
Total Credit Hours			15

Minor in Applied Mechanics

Required Courses - Aerospace Engineering Majors only

Code	Title		Credit Hours
MMAE 432	Design of Mechanical Systems		3
or MMAE 433	Design of Thermal Systems		
Select a minimum of four courses from the following:			12
MMAE 302	Advanced Mechanics of Solids	3	
or MMAE 332	Design of Machine Elements		
MMAE 321	Applied Thermodynamics	3	
MMAE 323	Heat and Mass Transfer	3	
MMAE 445	Computer-Aided Design	3	
MMAE 485	Manufacturing Processes	3	
Total Credit Hours			15

Required Courses - Materials Science Engineering Majors only

Code	Title	Credit Hours
MMAE 302	Advanced Mechanics of Solids	3
or MMAE 332	Design of Machine Elements	
MMAE 313	Fluid Mechanics	3
MMAE 323	Heat and Mass Transfer	3
MMAE 350	Computational Mechanics	3
MMAE 432	Design of Mechanical Systems	3
or MMAE 445	Computer-Aided Design	
Total Credit Hours		15

Minor in Electromechanical Design and Manufacturing

Required Courses - Aerospace Engineering Majors only

Code	Title	Credit Hours
BUS 305	Operation and Supply Chain Des	3
ECE 218	Digital Systems	4
ECE 242	Digital Computers&Computing	3
ECE 441	Microcomputers/Embedded Comp (replaces MMAE 315)	4
MMAE 445	Computer-Aided Design	3
MMAE 485	Manufacturing Processes	3
Total Credit Hours		20

Required Courses - Mechanical Engineering Majors only

Code	Title	Credit Hours
BUS 305	Operation and Supply Chain Des	3
ECE 218	Digital Systems	4
ECE 242	Digital Computers&Computing	3
ECE 441	Microcomputers/Embedded Comp (replaces MMAE 319)	4
MMAE 485	Manufacturing Processes	3
Total Credit Hours		17

Minor in Manufacturing Engineering

Code	Title		Credit Hours
Select a minimum of 15 credit hours from the following: [1]			15
CAE 523	Statistical Analysis Engg Data	3	
EMGT 406	Entrepreneurship & IP Mgmt [2]	3	
EMGT 470	Project Management [2]	3	
ENGR 200 & ENGR 411	Entrepreneurship NOW! and Fabrication Practices [2]	4	
INTM 436	Lean Manufacturing	3	
INTM 441	Supply Chain Management	3	
INTM 446	Manufacturing & Logistics Info	3	
MMAE 485	Manufacturing Processes	3	
MMAE 546	Adv Manufacturing Engineering	3	
MMAE 547	Comp Intgrted Manuf Technlgies	3	
MMAE 557	Comp Intgrtd Manfctrng Systms	3	
MMAE 560	Ststcl Quality Procs Control	3	
MMAE 589	Apps in Reliability Engg I	3	

MMAE 590	Apps Reliabilty Engineering II	3	
Total Credit Hours			15

[1] Minor courses may not be courses required for a degree program. A minimum of nine credit hours must be MMAE courses.

[2] Students may only apply one of the following selections to their minor requirements: EMGT 406, EMGT 470, or ENGR 200 and ENGR 411.

Minor in Materials Science

Required Courses - Aerospace Engineering Majors only

Code	Title		Credit Hours
MMAE 365	Strctr & Propts of Materials I		3
MMAE 370	Materials Laboratory I		3
MMAE 463	Strctr&Propts of Mtrl II		3
Select a minimum of two courses from the following:			6
MMAE 465	Electrl,Mgntc & Optic	3	
MMAE 470	Intro to Polymer Science	3	
MMAE 472	Advanced Aerospace Materials	3	
or MMAE 482	Composites		
MMAE 476	Materials Laboratory II	3	
MMAE 485	Manufacturing Processes	3	
Total Credit Hours			15

Required Courses - Mechanical Engineering Majors only

Code	Title		Credit Hours
MMAE 365	Strctr & Propts of Materials I		3
MMAE 370	Materials Laboratory I		3
MMAE 463	Strctr&Propts of Mtrl II		3
Select a minimum of two courses from the following:			6
MMAE 465	Electrl,Mgntc & Optic	3	
MMAE 470	Intro to Polymer Science	3	
MMAE 472	Advanced Aerospace Materials	3	
or MMAE 482	Composites		
MMAE 476	Materials Laboratory II	3	
Total Credit Hours			15

Required Courses - Non-MMAE Majors only

Code	Title		Credit Hours
MMAE 365	Strctr & Propts of Materials I		3
MMAE 463	Strctr&Propts of Mtrl II		3
MMAE 465	Electrl,Mgntc & Optic		3
MS 201	Materials Science		3
Select a minimum of one course from the following:			3
MMAE 370	Materials Laboratory I	3	
MMAE 470	Intro to Polymer Science	3	
Total Credit Hours			15

Minor in Energy/Environment/Economics

Required Courses

Code	Title		Credit Hours
CHE 543	Energy Envir Economics		3
Select six credit hours from the following:			6
CHE 465	Electrochem Energy Cnvrsn	3	
CHE 467	Fuel Cell Syst Design	3	
CHE 489	Fluidization	3	
CHE 491	Undergraduate Research	1-20	
CHE 541	Renwble Engry Technologies	3	
CHE 542	Fludzatn Gas-Solids Flw System	3	
CHE 565	Fund of Electrochemistry	3	
CHE 582	Intfcl Clldl Phnmna Applctn	3	
ECE 319	Fndmntls of Power Engrn	4	
ECE 411	Power Electronics	4	
ECE 419	Power Systems Analysis w/Lab	4	
ECE 420	Analyt. Methods for Power Syst	3	
ECE 438	Control Systems	3	
MMAE 425	Direct Energy Conversion	3	
MMAE 426	Nuclear F-F & Sust Energy Sys	3	
or MMAE 522	Nuclear F-F & Sust Energy Sys		
MMAE 524	Fundamentals of Combustion	3	
MMAE 525	Fundamentals of Heat Transfer	3	
Select six credit hours from the following:			6
ECE 491	Undergraduate Research	1-3	
ECE 497	Special Problems	1-4	
ECON 423	Econ Anal Capital Investments	3	
ENVE 404	Water & Wastewater Engineering	3	
ENVE 463	Intro Air Pollution Control	3	
ENVE 485	Industrial Ecology	3	
MMAE 491	Undergraduate Research	1-6	
MMAE 494	Undergraduate Design Project	1-3	
MMAE 497	Undergraduate Special Topics	1-6	
PS 338	Energy Policy	3	
Total Credit Hours			15

Appropriate substitutions may be made with the approval of the minor adviser.

College of Architecture

Reed Kroloff
Dean
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The program in architecture was established at Armour Institute of Technology, one of Illinois Institute of Technology's predecessors, in 1895. In 1938, the program came under the directorship of the world-renowned architect and educator Ludwig Mies van der Rohe. The college is housed in S.R. Crown Hall, a National Historic Landmark, one of Mies' most significant buildings, and a major contribution to Chicago's rich architectural heritage. The college emphasizes applied studio work under the instruction of practicing architects; the study of architectural theory; interdisciplinary learning; digital technologies; sustainability; design/build; and international study.

Associate Dean of University and Academic Affairs
Eva Kultermann

Assistant Dean
Susan Conger-Austin

Director of Bachelor of Architecture Program
Frank Flury

Faculty with Research Interests
For information regarding faculty visit the College of Architecture website.

Degree Programs

- Bachelor of Architecture (p. 111)

Co-Terminal Programs

The College of Architecture also offers the following co-terminal degrees, which enable a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Architecture/Master of Science in Architecture
- Bachelor of Architecture/Master of Engineering in Construction Engineering and Management

Co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the College of Architecture website (arch.iit.edu).

Minors and Architecture Electives

College of Architecture students may pursue a minor in another department; however, the requirements for a minor must be met in addition to the curricular requirements for the Bachelor of Architecture degree. Requirements for architecture electives are most often met by courses offered in the College of Architecture. When deemed appropriate by an adviser or a dean, and in consultation with the Office of Undergraduate Academic Affairs, a select number of courses from other departments may serve as an architecture elective. These have included ID courses in architectural photography or selected CAE courses related to construction management or civil and architectural engineering. Students should consult with their academic adviser early in their program of study.

Please see the Minors section (p. 26) for additional information.

Minors

- Minor in Architecture (p. 118)

Bachelor of Architecture

Through its deep commitment to a rigorous architectural education and its historic contributions to the legacy of modernism, the College of Architecture enjoys an unparalleled international reputation. With a pedagogy based on the synthesis of practice and research, Illinois Institute of Technology offers the professional, five-year Bachelor of Architecture (B.Arch.). Accredited by the National Architectural Accrediting Board (NAAB), this well-established degree program prepares architects to apply visual communication, design, analytical, and professional skills to provide inventive solutions to a broad range of design problems.

Drawing strength from a lineage that reaches back to the Bauhaus, the faculty and curriculum of the college are committed by way of vigorous research to the material culture of the built environment, to a sophisticated integration of technology and design, and to a deep engagement with professional practice. The college challenges students to engage with a full range of contemporary issues, including sustainability, global urbanization, material and structural advances, design/build integration, digital modeling and fabrication, and design theory and criticism. The students, faculty, and alumni foster an academic environment that is intellectually stimulating, professionally challenging, committed to innovation, and international in scope.

The profession of architecture is changing, due to forces both internal and external. Developments in technology offer architects new representational tools that change how projects are conceived. Digital fabrication tools provide architects new means of realizing their projects and suggest a future in which architects move between the studio and the shop, working side-by-side with fabricators to make their visions a reality. The college prepares students to take command of these new technologies and forge a future that embraces new modes of thinking and making.

While technology is reshaping architecture within, the profession is also being affected by external forces. Economic factors and changes in project delivery are upsetting traditional power structures within the industry, while the increasing complexity of building projects is leading toward specialization within the field and the creation of new alliances. Within this rapidly-changing environment, architects of tomorrow will have to be agile, carving their own paths through the profession and authoring their own careers. The B.Arch. degree program stresses research, analysis, and synthesis as the means to prepare students for an expanding field in which resourcefulness, critical thinking, and the ability to seize opportunity and new territories of intervention will be rewarded.

As Illinois Institute of Technology focuses on a future of global urbanism and instills in its students a profound awareness of the changing world around them, it also acknowledges what does not change, remaining true to its legacy as a place of rigorous thinking and making. Amidst new patterns of urbanization and technological advances, and against the backdrop of a changing profession, the College of Architecture is still a place where how a thing is made matters—whether it is a door, a building, or a city.

Curriculum Overview

The curriculum for the B.Arch. is organized thematically into “strands” corresponding to different areas of the curriculum: design, technology, history/theory, design communication, and professional practice. The design strand includes design studio courses as well as elective courses in design and independent studies. The technology strand covers courses in structural engineering, environmental systems, and elective courses in advanced building technology. The history/theory strand includes required and elective courses in architectural history, theory, and cultural studies. The design communication strand includes courses to develop the student’s design thinking, computation skills, drawing, writing, and verbal abilities. Professional practice courses educate students in contemporary practice and prepare them for future trends. General education courses in the humanities, social sciences, mathematics, and other disciplines define the remaining coursework.

In the first years, students are introduced to the fundamental elements of architecture and aspects of the profession. Students are given an introduction to the history and theory of architecture and guided to develop their skills of communication (verbal, graphic, and written). Intermediate years of the program continue to develop the students’ skills while engaging them with issues of contemporary architecture and urbanism in design studios and related coursework that focus on the architectural and infrastructural elements that comprise the city. The final year of the architecture program introduces students to urban design in research-based, forward-looking studios that speculate on the city of the future and related coursework on the city and global urbanism.

Design Studios

The curriculum is centered on a studio sequence of increasing complexity. Over the first four years, studio topics grow from small projects focused on basic material connections, through increasingly complex programs and building systems, to arrive at comprehensive design, encompassing the full range of architectural knowledge. The final year of the program is structured around advanced studios devoted to specialized topics.

History/Theory

The history and theory sequence of our curriculum presents the intellectual contexts within which architecture, urbanism, and landscape architecture are practiced and interpreted. These courses introduce the buildings, cities, sites, projects, texts, images, people, movements, schools, and concepts that have shaped architecture in the past and that shape architecture today. In addition to this content, the history and theory coursework also teaches methods of visual analysis, close reading, critical thinking, and effective writing.

Our goal is to provide an understanding of the complex intellectual, aesthetic, technical, and political contexts within which architecture arises. Primary source readings by architects, critics, novelists, and theorists are essential to this approach. An overriding aim of these courses is to articulate the irreducibly rich relationships between buildings, cities, and landscapes as material artifacts and the ideas that surround them.

The history and theory sequence begins with a set of core classes that provide a broad introduction to architecture and urbanism, covering examples from around the world and throughout history. These courses are built upon a core set of projects, texts, and concepts that provide our students with a foundation for their studies and careers. This core sequence is followed by advanced classes—mostly electives selected from a changing menu of seminars—that expand into more sophisticated and specialized topics in smaller class settings.

Technology

The technology curriculum provides students an understanding of the building systems and technologies impacting the design of the built environment. The sequence starts with an introduction to structural concepts and structural proportioning, followed by courses in structural systems and the elements of structure. Advanced level courses on the development of structural form and structural analysis introduce students to more sophisticated techniques.

Running parallel with this coursework is an integrated sequence of materials courses—concrete, masonry, metals, woods and plastics, and glass—intended to provide an in-depth knowledge of building materials. Building systems are taught in a two-semester course sequence and integrated into studio work in a comprehensive building design project.

Design Communication

The field of communication is entangled in the processes of design, including all modalities of media, data, and computational processes, and the entire spectrum of sensory input and output. The design communication curriculum heralds a deeply entangled hybridity of physical and digital. It circumvents the term “virtual,” to disallow the way in which it undermines the true physical and cognitive realities of the digital. We are in the beginning of an age where the built environment is constituted through an “Internet of Things.” We will increase the fluency of our students across a spectrum of languages: spoken, written, composed, constructed, and coded.

Professional Practice

The primary objective of the professional practice coursework is to instill awareness and understanding of the conceptual framework and knowledge base necessary to facilitate the transition from the university to the rapidly-evolving world of professional practice. After completing the professional practice coursework, students will be able to evaluate career options and establish a focused career path, command the knowledge required to begin their careers responsibly and effectively, and understand the processes whereby continuing learning can take place. Students will develop a sense of themselves as members of a profession, an understanding of the legal, social, and cultural responsibilities of the architect, and the potential roles of the architect in society.

Electives

In addition to design studios, courses include architectural history and theory, building technologies, structures, design technologies, design communication, and professional practice, as well as courses beyond architecture, for a well-rounded undergraduate education. Elective courses will provide some of the most valuable and memorable learning experiences in the Bachelor of Architecture program. Taken during the fourth and fifth year of studies, architecture electives allow students to diversify or concentrate their areas of knowledge.

Students may select courses in digital applications, history and theory, landscape architecture, advanced drawing, architectural photography, visual training, design/build, management, and specialized independent studies.

Advanced courses in architectural materials, construction technology, energy conscious design, and structures emphasize the interrelationship of engineering and architecture, while digitally-enriched electives will maximize readiness to use tomorrow’s most sophisticated design, analysis, and presentation tools. Courses in entrepreneurship, project and construction management, and other subjects prepare students for the day-to-day practice of architecture.

Professional Degree

The undergraduate professional degree program at Illinois Institute of Technology has always been a comprehensive five-year accredited Bachelor of Architecture (B.Arch.) degree. The curriculum provides the fundamental body of knowledge required by the profession. Each design studio is team taught to horizontally integrate all courses within each year and vertically sequence learning experiences. This professional background prepares students for the last year of advanced design studios focused on spatial awareness, comprehensive building design, and the design of large building complexes.

The university has also taken a leadership role in addressing the responsibilities of professional education for the 21st century’s global workplace. While technical proficiency will always be necessary, Illinois Institute of Technology recognizes that colleges must also educate students to work as part of teams, to communicate well, and to understand the economic, social, ethical, environmental, and international context of their profession. Faculty broaden the upper-level studios to resemble real-world interdisciplinary projects. This emphasis on holistic learning, when combined with a new global vision and advanced computer and communication technology, positions Illinois Institute of Technology and the College of Architecture on the leading edge of architectural education.

Accreditation

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted up to an eight-year term of accreditation, depending on the extent of its conformance with established educational standards.

The College of Architecture has two NAAB-accredited degrees: the Bachelor of Architecture and the Master of Architecture professional degree programs. Both hold eight-year terms of accreditation with the NAAB.

Academic Standards

The Bachelor of Architecture is a professional degree, accredited by NAAB. The Illinois Institute of Technology curriculum must comply with the NAAB's Conditions for Accreditation, which define minimum standards of knowledge in professional education. The college alone is responsible for maintaining professional standards, high academic quality, and the purposeful integration and sequencing of general education and prerequisite courses to meet the NAAB's criteria for student performance. These criteria encompass two levels of accomplishment: understanding and ability. In meeting these criteria, the college prepares students for the profession and its practice. Students are expected to monitor their degree progress and work closely with their academic adviser to insure they are complying with academic requirements while meeting college and university standards.

With the Office of Undergraduate Academic Affairs, the college routinely evaluates degree progress and academic standards for all architecture students. When student performance repeatedly falls below college and university academic standards, students may be placed on academic probation or dismissed. The studio sequence is the core of the curriculum. Students may continue their studio enrollment only when all prerequisite courses are satisfactorily completed.

To maintain academic and professional standards, the college may restrict or postpone a student's studio enrollment under any of the following conditions: failure of any prerequisite studio, unmet prerequisite courses (general education or support courses), university academic probation, or if a student's studio GPA falls below 2.25. Students and their advisers are notified each semester if these conditions arise.

Transfer Students

Depending on their previous studio and architecture courses, transfer students will begin their studio sequence at the college in one of the foundation studios: years one, two, or three. The last six studios must be taken at the university. Students attending a four-year university who have completed three years of coursework are discouraged from applying to the university as a B.Arch. transfer student. Transfer credit is awarded based upon an evaluation of general education courses by the Office of Undergraduate Academic Affairs.

Transfer credit for architecture courses is determined by an individual portfolio review conducted by college faculty. Portfolios must include examples of student work, official course descriptions, a course syllabus, and supporting documents. Studio placement will depend not only on previous studio work, but also upon the completion of all prerequisite courses in related subjects such as math, physics, structures, and design communications.

Visiting Students

Non-degree visiting students who wish to transfer to the university and complete a B.Arch. degree must re-apply for admission as a transfer student. Upon admission, they will follow the same requirements for studio placement and transfer credit as all transfer students. Visiting students seeking one semester of study are encouraged to apply for the fall semester only.

Change of Major to Architecture (B.Arch.)

Students admitted to the university in another major are asked to petition the College of Architecture for admission to the professional degree program. In addition to the Change of Major Form, students are required to meet with designated College of Architecture staff to initiate their application and discuss the requirements of the five-year degree. Students should have a minimum cumulative GPA of 3.00 at Illinois Institute of Technology for consideration.

Required Courses

Code	Title	Credit Hours
Architecture Requirements		**(78)**
ARCH 100	Introduction to Architecture	3
ARCH 107	Design Communications I	3
ARCH 108	Design Communications II	3
ARCH 113	Arch Studio I: Elements	6
ARCH 114	Architecture Studio II: Unit	6
ARCH 201	Architecture Studio III: House	6
ARCH 202	Arch Studio IV: Multiple	6
ARCH 207	Design Communications III	3
ARCH 215	Site Design, Plan, & Ecology	3
ARCH 305	Architecture Studio V: Hybrid	6
ARCH 306	Arch Studio VI: Hybrid	6
ARCH 413	Architectural Practice	3
ARCH 417	Arch Studio VII: Synthesis	6
ARCH 418	Arch Studio VIII: Synthesis	6
ARCH 419	Arch Cloud Studio IX: Metro	6
ARCH 420	Arch Cloud Studio X: Metro	6
Building Science and Structural Requirements		**(18)**
ARCH 230	Systems: Structural Analysis	3
ARCH 334	Material: Metal	3
ARCH 335	Material: Cementitious	3
ARCH 403	Environment & Bldg Systems I	3
ARCH 404	Environment & Bldg Systems II	3
ARCH 482	Material: Fibrous	3
or ARCH 483	Material: Transparent	
Art and Architectural History Requirements		**(9)**
AAH 119	Hist of World Architecture I	3
AAH 120	Hist of World Architecture II	3
ARCH 321	Contemporary Architecture	3
Architectural History Elective		**(3)**
Select three credit hours		3
Architecture and Urbanism Requirements		**(6)**
AURB 201	The Metropolis	3
AURB 465	Contemporary Urbanism	3
Architecture Electives		**(15)**
Select 15 credit hours		15
Mathematics Requirements		**(6)**
MATH 119	Geometry for Architects	3
MATH 122	Introduction to Calculus	3
Physics Requirement		**(4)**
PHYS 200	Energy, Waves, Mtrls, & Forces	4
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Non-Architecture Elective		**(3)**
Select three credit hours [1]		3
Total Credit Hours		169

[1] A non-architecture elective cannot be an AAH, ARCH, AURB, LA, or CAE course.

Minors and Architecture Electives

College of Architecture students may pursue a minor in another department; however, the requirements for a minor must be met in addition to the curricular requirements for the Bachelor of Architecture degree. Requirements for architecture electives are most often met by courses offered in the College of Architecture. When deemed appropriate by an adviser or a dean, and in consultation with the Office of Undergraduate Academic Affairs, a select number of courses from other departments may serve as architecture electives. These have included ID courses or selected CAE courses related to construction management or civil and architectural engineering. Students should consult with their academic adviser early in their program of study. The following list includes some typical minors for architecture students.

- Business
- Entrepreneurship
- Psychology
- Urban Studies

Additional minors in humanities or social sciences that may be of interest:

- Policy and Ethics
- Public Policy

Minors in civil and architectural engineering:

- Building Systems Engineering
- Construction Management
- Structural Engineering

Bachelor of Architecture Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ARCH 113	6	ARCH 114	6
ARCH 100	3	ARCH 108	3
ARCH 107	3	MATH 122	3
MATH 119	3	AURB 201	3
Humanities 200-level Course	3		
	18		15

			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ARCH 201	6	ARCH 202	6
ARCH 207	3	ARCH 215	3
AAH 119	3	AAH 120	3
PHYS 200	4	ARCH 230	3
		Humanities or Social Sciences Elective	3
	16		18

			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ARCH 305	6	ARCH 306	6
ARCH 334	3	ARCH 321	3
ARCH 403	3	ARCH 335	3
AURB 465	3	ARCH 404	3
Social Sciences Elective	3	Humanities Elective (300+)	3
	18		18

			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ARCH 417	6	ARCH 418	6
ARCH 482 or 483	3	ARCH 413	3
Architecture Elective	3	IPRO Elective I	3
Architectural History Elective	3	Architecture Elective	3
Social Sciences Elective (300+)	3	Non-Architectural Elective[1]	3
	18		18

			Year 5
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ARCH 419	6	ARCH 420	6
IPRO Elective II	3	Architecture Elective	3
Architecture Elective	3	Architecture Elective	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
	15		15

Total Credit Hours: 169

1 A non-architecture elective cannot be an AAH, ARCH, AURB, LA, or CAE course.

Specializations in Architecture

The global practice of architecture invites students to develop an extensive background in related areas of expertise. Within the required curriculum, students may select from studios and architecture electives to satisfy an area of specialization. Working with their academic advisers, students are encouraged to identify a specialization in their second or third year of study in order to plan the appropriate sequence of courses. Credit requirements for each specialization are met by a combination of required core courses, advanced studios, and architecture electives.

Prior approval for electives is required. The following list includes the specializations available for architecture students. Students should consult their academic advisers or the associate dean of the college for appropriate courses.

Architectural History and Theory

In addition to the required history/theory courses, including the architectural history elective, students must take three additional history/theory electives (nine credit hours).

Design/Build

In addition to a design/build studio (ARCH 417 or ARCH 418), students must take three design/build electives (nine credit hours).

Digital Design

In addition to the required design communications courses, students must take three digital design electives (nine credit hours).

Landscape Architecture

In addition to a landscape architecture cloud studio (ARCH 419 or ARCH 420), students must take three landscape architecture electives (nine credit hours).

Self-Directed Specialization

A student may propose a self-directed specialization in a relevant architectural subject. A self-directed specialization must be approved by the student's adviser and the college and must include a minimum of three architectural electives (nine credit hours) in addition to the required core/studio courses related to the specialization.

Co-Terminal, Dual Degree, and Dual Major Options

Bachelor of Architecture/Master of Engineering in Construction Engineering and Management Co-Terminal Degree

Students interested in the co-terminal degree should contact the CAEE adviser and apply through the Office of Graduate Admission. Students must have at least one full semester of undergraduate coursework remaining at the time of application.

Bachelor of Architecture/Master of Business Administration (M.B.A.)

Students interested in pursuing the Bachelor of Architecture/M.B.A. dual degree program are required to apply for admission to the graduate M.B.A. program, providing GMAT scores and all other necessary materials. Application should be made prior to the end of the seventh semester of the Bachelor of Architecture. Upon admission, students may complete up to 12 credit hours of M.B.A. courses prior to joining the program full time. Contact the Stuart School of Business for more information.

Bachelor of Architecture/Master of Engineering in Structural Engineering Dual Degree

Includes prerequisites for the Master of Engineering in Structural Engineering program. Students interested in the Bachelor of Architecture/Master of Engineering in Structural Engineering should contact the CAEE adviser as soon as possible in their studies.

Bachelor of Architecture/Master of Architectural Engineering Dual Degree

See the CAEE department for more information.

Bachelor of Architecture/Bachelor of Science in Architectural Engineering Dual Major

Students working toward a Bachelor of Architecture and B.S. in Architectural Engineering will have overlap in several classes, and eliminating classes that overlap can reduce the time it would take to complete the two degrees separately. The dual major will typically take six years. Students interested in the architectural engineering dual major should contact the CAEE adviser as soon as possible in their studies.

Study Abroad

The reality of architectural practice today is that it is global. Study abroad has a long and important history in the training of architects and the college's desire is to make this essential experience central to each of our student's education. The college provides multiple possibilities allowing for students to participate in both short-term and long-term international off-campus programs. Undergraduate students may participate in college-led, semester-long programs as part of the fifth year advanced studios or in advanced studio field work programs for several weeks. The college also maintains partner and exchange agreements with numerous foreign institutions allowing students in the fourth year to study abroad and transfer credits back into their program at the university.

All coursework taken outside of the College of Architecture must be preapproved by the Office of Undergraduate Academic Affairs and the course of study must be approved by the college's coordinator of international programs and the student's adviser. On return, the student will be asked to supply the course description, syllabus, transcript, and assignments for all coursework completed; a portfolio of studio work will also be required. All work will be reviewed by an appropriate member of the College of Architecture faculty before Illinois Institute of Technology credit is granted.

Summer and intersession programs include college-led electives and international seminars with exchange and partner institutions or project-based workshops.

Minor in Architecture

Required Courses - Non-Architecture Majors only

Code	Title		Credit Hours
ARCH 100	Introduction to Architecture		3
ARCH 107	Design Communications I		3
ARCH 113	Arch Studio I: Elements		6
AAH 119	Hist of World Architecture I		3
or AAH 120	Hist of World Architecture II		
Select a minimum of one course from the following:			3
ARCH 108	Design Communications II	3	
ARCH 114	Architecture Studio II: Unit [1]	6	
ARCH 321	Contemporary Architecture	3	
ARCH 413	Architectural Practice	3	
AURB 201	The Metropolis	3	
Total Credit Hours			18

1 Students preparing for competitive application to graduate programs in architecture are encouraged to select ARCH 114.

College of Computing

Lance Fortnow
Dean
IIT Tower, Suite 1400
10 W. 35th Street
Chicago, IL 60616
312.567.5922
iit.edu/computing

The College of Computing, founded in 2020, is the newest college at Illinois Tech dedicated to ensuring students across campus have the computing and data science ideas and skills needed to succeed in today's technological society. The college offers dozens of degrees and certificates in computing from the foundational to the applied as well as mathematical and manufacturing processes through our four departments/programs: Applied Mathematics, Computer Science, Industrial Technology and Management and Information Technology and Management."

Applied Mathematics (p. 121)

Computer Science (p. 133)

Industrial Technology and Management (p. 150)

CERTIFICATE PROGRAM

Information Technology and Management (p. 157)

Applied Mathematics

John T. Rettaliata Engineering Center, Suite 208
10 W. 32nd St.
Chicago, IL 60616
312.567.8980
amath@iit.edu
iit.edu/applied-mathematics

Chair
Chun Liu

Associate Chair and Director of Undergraduate Studies
Michael J. Pelsmajer

Faculty with Research Interests
For information regarding faculty visit the Department of Applied Mathematics website.

Applied mathematics is the mathematics that is created in response to problems in science, engineering, and society. Applied mathematicians work on a wide variety of topics such as how to construct methods for multi-criteria decision making (requiring discrete mathematics and statistics), predicting how the financial markets will behave (requiring probability/statistics, analysis, optimization), analyzing how liquid flows around solids, and how ions move in biological environments (requiring expertise in computational methods and analysis). Students with an applied mathematics background are prepared for careers in the insurance industry, electronics and computer manufacturers, logistics companies, pharmaceutical firms, and more. An applied mathematics background also prepares students for continuing on the academic path, in graduate programs in pure and applied mathematics, statistics, data science, and financial mathematics.

Our graduates work in financial and insurance companies as analysts, computer and IT companies as programmers and hardware developers, and in many different fields as researchers, as well as in academia. They have gone to excellent graduate schools in mathematics (pure, applied, and financial), statistics, physics, design, accounting, and M.B.A. programs. Students have the flexibility to assemble a portfolio of courses that will satisfy both intellectual needs and career preparation. There is a wide variety of courses offered, with strengths in contemporary topics in applied mathematics: stochastic analysis (including mathematical finance), applied analysis, computational mathematics, discrete mathematics, and statistics.

The department offers two degree programs, a B.S. in Applied Mathematics and a B.S. in Statistics. A minor is required, which gives students an area of focus where mathematics or statistics may be applied. With a minor in computer science, business, or one of the engineering areas, for example, the student will be well prepared to enter the job market in business or government.

If desired, students can select a specialization (taking electives appropriate for different career paths) or double major in another subject such as computer science or physics. There is also the option of a co-terminal degree, where a student graduates with a B.S. and a master's degree at the same time, in as little as five years.

Degree Programs

- Bachelor of Science in Applied Mathematics (p. 123)
- Bachelor of Science in Statistics (p. 129)

Co-Terminal Options

The Department of Applied Mathematics also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Applied Mathematics/Master of Science in Applied Mathematics
- Bachelor of Science in Applied Mathematics/Master of Computer Science
- Bachelor of Science in Applied Mathematics/Master of Science in Computer Science
- Bachelor of Science in Applied Mathematics/Master of Data Science
- Bachelor of Science in Applied Mathematics/Master of Mathematical Finance

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Applied Mathematics website (science.iit.edu/applied-mathematics/programs).

Minors

Bachelor of Science in Applied Mathematics

Applied mathematics is the mathematics that is created in response to problems in science, engineering, and society. Applied mathematicians work on a wide variety of topics such as how to construct methods for multi-criteria decision making (requiring discrete mathematics and statistics), predicting how the financial markets will behave (requiring probability/statistics, analysis, optimization), analyzing how liquid flows around solids, and how ions move in biological environments (requiring expertise in computational methods and analysis). Students with an applied mathematics background are prepared for careers in the insurance industry, electronics and computer manufacturers, logistics companies, pharmaceutical firms, and more. An applied mathematics background also prepares students for continuing on the academic path, in graduate programs in pure and applied mathematics, statistics, data science, and financial mathematics.

Our graduates work in financial and insurance companies as analysts, computer and IT companies as programmers and hardware developers, and in many different fields as researchers, as well as in academia. They have gone to excellent graduate schools in mathematics (pure, applied, and financial), physics, design, accounting, and M.B.A. programs. Students have the flexibility to assemble a portfolio of courses that will satisfy both intellectual needs and career preparation. There is a wide variety of courses offered, with strengths in contemporary topics in applied mathematics: stochastic analysis (including mathematical finance), applied analysis, computational mathematics, discrete mathematics, and statistics.

A minor is required, which gives students an area of focus where mathematics may be applied. It consists of five or more related courses in an area outside of applied mathematics. With a minor in computer science, business, or one of the engineering areas, for example, the student will be well prepared to enter the job market in business or government.

If desired, a student can choose a specialization, which selects electives appropriate for different career paths. Another popular option is to double major in both applied mathematics and another subject, such as computer science or physics. There is also the option of a co-terminal degree, where a student graduates with a B.S. and a master's degree at the same time, in as little as five years.

Required Courses

Code	Title		Credit Hours
Applied Mathematics Requirements			**(42)**
MATH 100	Introduction to the Profession		3
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 230	Introduction to Discrete Math		3
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
MATH 332	Elementary Linear Algebra		3
MATH 350	Intro to Computational Mathe		3
MATH 380	Intro to Mathematical Modeling		3
MATH 400	Real Analysis		3
Select one of the following:			3
MATH 410	Number Theory	3	
MATH 430	Applied Algebra	3	
MATH 431	Computational Algebraic Geom	3	
MATH 454	Graph Theory and Applications	3	
MATH 475	Probability		3
Applied Mathematics Electives			**(18)**
Select 18 credit hours [1]			18
Minor Requirement			**(15)**
Select five related courses from an area outside of applied mathematics			15
Computer Science Requirements			**(4-6)**
Select one of the following sequences:			4-6
CS 115 & CS 116	Object-Oriented Programming I and Object-Oriented Programming II	4	
CS 104 & CS 201	Intro to Comp Prgrm for Engrs and Accelerated Intro to Cmptr Sci	6	
CS 105 & CS 201	Intro to Computer Programming and Accelerated Intro to Cmptr Sci	6	

Science Requirement		**(4)**
PHYS 123	General Physics I: Mechanics	4
Science Electives		**(9)**
Select nine credit hours		9
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(9)**
Select nine credit hours		9

Minimum degree credits required: 128

[1] Applied mathematics electives are to be chosen after consultation with an academic adviser. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on the Specializations tab may also serve as a guide to applied mathematics elective selection.

Bachelor of Science in Applied Mathematics Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 100	3	MATH 152	5
MATH 151	5	MATH 230	3
Computer Science Course[1]	2	Computer Science Course[1]	2
Science Elective	3	PHYS 123	4
Humanities 200-level Course	3	Social Sciences Elective	3
	16		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 251	4	MATH 252	4
MATH 332	3	MATH 380	3
Minor Elective	3	Minor Elective	3
Science Elective	3	Science Elective	3
Humanities or Social Sciences Elective	3	Social Sciences Elective (300+)	3
	16		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 430 or 431[2]	3	MATH 350	3
MATH 475	3	MATH 410 or 454[2]	3
Applied Mathematics Elective[3]	3	Applied Mathematics Elective[3]	3
Minor Elective	3	IPRO Elective I	3
Humanities Elective (300+)	3	Minor Elective	3
Free Elective	3		
	18		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 400	3	IPRO Elective II	3
Minor Elective	3	Applied Mathematics Elective[3]	3
Applied Mathematics Elective[3]	3	Applied Mathematics Elective[3]	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
Free Elective	3	Free Elective	3
	15		15

Total Credit Hours: 128

1. Students must complete one of the following computer science sequences: CS 115 and CS 116, CS 104 and CS 201, or CS 105 and CS 201.
2. Applied mathematics majors are required to take one of the following: MATH 410, MATH 430, MATH 431, or MATH 454. MATH 430 and MATH 431 are offered only during fall semesters; MATH 410 and MATH 454 are offered only during spring semesters. If a student chooses to take only one of these courses, then the other slot is to be interpreted as an applied mathematics elective.
3. Applied mathematics electives are to be chosen after consultation with an academic adviser. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on the Specializations tab may also serve as a guide to applied mathematics elective selection.

Applied Mathematics Specializations

In addition to the general B.S. in Applied Mathematics degree, the department offers five special five-course sequences that may be used as a guide for the selection of mathematics electives and will prepare the student for a career in:

- business/finance
- industrial research
- graduate school

Choosing any of the following specializations is optional.

Specialization in Applied Analysis

Program adviser: J. Duan

Applied analysis is one of the foundations for interdisciplinary applied mathematics. The principles of analysis are applied to such areas as partial differential equations, dynamical systems, and numerical analysis. The basic framework, concepts, and techniques of modern mathematical analysis are essential for modeling, analysis, and simulation of complicated phenomena in engineering and science.

Required Courses

Code	Title	Credit Hours
MATH 380	Intro to Mathematical Modeling	3
MATH 400	Real Analysis	3
MATH 461	Fourier Sers&Boudary-Val Probs	3
MATH 488	Ordry Diff Equ/Dynamical Syst	3
MATH 489	Partial Differential Equations	3
Closely related courses which are recommended as additional electives include:		
MATH 402	Complex Analysis	3
MATH 478	Num Mthds for Diff Equations	3
MATH 486	Mathematical Modeling I	3

MATH 380 and MATH 400 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Recommended minors include: Physics or an engineering minor.

Specialization in Computational Mathematics

Program adviser: X. Li

The use of computation/simulation as a third alternative to theory and experimentation is now common practice in many branches of science and engineering. Many scientific problems that were previously inaccessible have seen tremendous progress from the use of computation (e.g., many-body simulations in physics and chemistry, simulation of semi-conductors, etc.). Researchers and scientists in these areas must have a sound training in the fundamentals of computational mathematics and become proficient in the use and development of new algorithms and analytical techniques as they apply to modern computational environments.

Required Courses

Code	Title	Credit Hours
MATH 350	Intro to Computational Mathe	3
MATH 435	Linear Optimization	3
or MATH 461	Fourier Sers&Boudary-Val Probs	
MATH 476	Statistics	3
MATH 477	Numerical Linear Algebra	3
MATH 478	Num Mthds for Diff Equations	3
Closely related courses which are recommended as additional electives include:		
MATH 431	Computational Algebraic Geom	3
MATH 435	Linear Optimization [1]	3
MATH 461	Fourier Sers&Boudary-Val Probs [1]	3
MATH 484	Regression	3
MATH 486	Mathematical Modeling I	3

MATH 488	Ordry Diff Equ/Dynamical Syst	3
MATH 489	Partial Differential Equations	3

[1] Only if not already counted as a required course.

MATH 350 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Recommended minors include: Artificial Intelligence, Computational Structures, or Software Engineering.

Specialization in Discrete Applied Mathematics

Program adviser: M. Pelsmajer

Discrete applied mathematics is a fairly young branch of mathematics and is concerned with using combinatorics, graph theory, optimization, and portions of theoretical computer science to attack problems in engineering as well as the hard and soft sciences.

Required Courses

Code	Title	Credit Hours
MATH 332	Elementary Linear Algebra	3
MATH 430	Applied Algebra	3
MATH 435	Linear Optimization	3
MATH 453	Combinatorics	3
MATH 454	Graph Theory and Applications	3
Closely related courses which are recommended as additional electives include:		
MATH 410	Number Theory	3
MATH 431	Computational Algebraic Geom	3

MATH 332 is required for all applied mathematics majors, and MATH 430 or MATH 454 satisfies the discrete mathematics core requirement. The other three courses count toward MATH electives.

Recommended minors include: Artificial Intelligence, Computational Structures, or Computer Networking.

Specialization in Mathematical Finance

Program adviser: T. Bielecki

Students who choose this specialization may qualify for admission to the Master of Mathematical Finance program—a collaborative program between the Stuart School of Business and the Department of Applied Mathematics. The objective of the MMF program is to provide individuals interested in pursuing careers in the finance industry with advanced education in theoretical, computational, and business aspects of relevant quantitative methodologies.

A business or entrepreneurship minor is required. See the Minors section (p. 26) for more details.

Required Courses

Code	Title	Credit Hours
MATH 475	Probability	3
MATH 476	Statistics	3
MATH 478	Num Mthds for Diff Equations	3
MATH 481	Intro to Stochastic Processes	3
MATH 485	Intro to Mathematical Finance	3
Closely related courses which are recommended as additional electives include:		
MATH 461	Fourier Sers&Boudary-Val Probs	3
MATH 477	Numerical Linear Algebra	3
MATH 483	Design and Analysis of Exprmnt	3
MATH 484	Regression	3
MATH 486	Mathematical Modeling I	3
MATH 489	Partial Differential Equations	3

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Specialization in Stochastics

Program Adviser: I. Cialenco

Stochastics includes traditional statistics (the methods of data analysis and inference) and probability (the modeling of uncertainty and randomness). However, also included are other areas where stochastic methods have been becoming more important in recent years such as stochastic processes, stochastic integration, stochastic dynamics, stochastic partial differential equations, probabilistic methods for analysis, mathematical finance, discrete mathematics, and computational methods for stochastic systems.

Required Courses

Code	Title	Credit Hours
MATH 475	Probability	3
MATH 476	Statistics	3
MATH 481	Intro to Stochastic Processes	3
MATH 485	Intro to Mathematical Finance	3
MATH 488	Ordry Diff Equ/Dynamical Syst	3
Closely related courses which are recommended as additional electives include:		
MATH 453	Combinatorics	3
MATH 483	Design and Analysis of Exprmnt	3
MATH 484	Regression	3
MATH 486	Mathematical Modeling I	3

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Bachelor of Science in Statistics

Required Courses

Code	Title		Credit Hours
Applied Mathematics Requirements			**(29)**
MATH 100	Introduction to the Profession		3
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 230	Introduction to Discrete Math		3
MATH 251	Multivariate & Vector Calculus		4
MATH 332	Elementary Linear Algebra		3
MATH 350	Intro to Computational Mathe		3
MATH 435	Linear Optimization		3
Statistics Requirements			**(15)**
MATH 225	Introductory Statistics		3
MATH 446	Introduction to Time Series		3
MATH 475	Probability		3
MATH 476	Statistics		3
MATH 484	Regression		3
Applied Mathematics Electives			**(15)**
Select 15 credit hours from the following courses, or any other approved AMAT elective: [1]			15
MATH 252	Introduction to Diff Equations	4	
MATH 380	Intro to Mathematical Modeling	3	
MATH 400	Real Analysis	3	
MATH 481	Intro to Stochastic Processes	3	
MATH 483	Design and Analysis of Exprmnt	3	
CS 422	Data Mining	3	
Minor Requirement			**(15)**
Select five related courses from an area outside of applied mathematics, computational mathematics, or statistics			15
Computer Science Requirements			**(7-9)**
Select one of the following sequences:			4-6
CS 115 & CS 116	Object-Oriented Programming I and Object-Oriented Programming II	4	
CS 104 & CS 201	Intro to Comp Prgrm for Engrs and Accelerated Intro to Cmptr Sci	6	
CS 105 & CS 201	Intro to Computer Programming and Accelerated Intro to Cmptr Sci	6	
CS 331	Data Structures and Algorithms		3
Natural Science and Engineering Requirements			**(10)**
See Illinois Tech Core Curriculum, section D (p. 25)			10
Humanities and Social Science Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Free Electives			**(8)**
Select eight credit hours			8

Minimum degree credits required: 126

[1] Applied mathematics/statistics electives are to be chosen after consultation with an academic adviser. Student goals, interests, and course availability should be determining factors in this selection process. Students can take CS 422 to replace one applied mathematics/statistics elective. CS 422 must be taken after CS 331, which is a required computer science course in this curriculum. The following courses do not count toward the requirements for this degree: MATH 119, MATH 122, MATH 130, MATH 148, MATH 180, MATH 333, MATH 374, MATH 425, MATH 426, and MATH 474.

Bachelor of Science in Statistics Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 100	3	MATH 152	5
MATH 151	5	MATH 230	3
MATH 225	3	Science Elective	4
Computer Science Course[1]	2	Computer Science Course[1]	2
Humanities 200-level Course	3	Social Sciences Elective	3
	16		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 251	4	MATH 435	3
MATH 332	3	Applied Mathematics/Statistics Elective[2]	3
CS 331	3	Minor Elective	3
Minor Elective	3	Science Elective	3
Humanities or Social Sciences Elective	3	Social Sciences Elective (300+)	3
	16		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 475	3	MATH 350	3
Applied Mathematics/Statistics Elective[2]	3	MATH 476	3
Minor Elective	3	Applied Mathematics/Statistics Elective[2]	3
Science Elective	3	IPRO Elective I	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
Free Elective	2		
	17		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 484	3	MATH 446	3
Applied Mathematics/Statistics Elective[2]	3	Applied Mathematics/Statistics Elective[2]	3
Minor Elective	3	Minor Elective	3
Humanities Elective (300+)	3	Free Elective	3
IPRO Elective II	3	Free Elective	3
	15		15

Total Credit Hours: 126

1. Students must complete one of the following computer science sequences: CS 115 and CS 116, CS 104 and CS 201, or CS 105 and CS 201.
2. Applied mathematics/statistics electives are to be chosen after consultation with an academic adviser. Student goals, interests, and course availability should be determining factors in this selection process. Students can take CS 422 to replace one applied mathematics/statistics elective. CS 422 must be taken after CS 331, which is a required computer science course in this curriculum. The following courses do not count toward the requirements for this degree: MATH 119, MATH 122, MATH 130, MATH 148, MATH 180, MATH 333, MATH 374, MATH 425, MATH 426, and MATH 474.

Minor in Applied Mathematics

Required Courses

Code	Title	Credit Hours
MATH 230	Introduction to Discrete Math	3
MATH 252	Introduction to Diff Equations	4
MATH 332	Elementary Linear Algebra	3
Select at least two mathematics courses at the 400-level [1]		6
Total Credit Hours		16

[1] MATH 425 may not be used toward the Applied Mathematics minor.

Minor in Computational Mathematics

Required Courses

Code	Title	Credit Hours
MATH 350	Intro to Computational Mathe	3
MATH 477	Numerical Linear Algebra	3
MATH 478	Num Mthds for Diff Equations	3
MATH 431	Computational Algebraic Geom	3
or MATH 435	Linear Optimization	
or MATH 461	Fourier Sers&Boudary-Val Probs	
MATH 476	Statistics	3
or MATH 486	Mathematical Modeling I	
or MATH 488	Ordry Diff Equ/Dynamical Syst	
Total Credit Hours		15

Minor in Statistics

Required Courses

Code	Title		Credit Hours
MATH 225	Introductory Statistics		3
MATH 332	Elementary Linear Algebra		3
MATH 475	Probability		3
MATH 476	Statistics		3
Select a minimum of three credit hours from the following:			3
MATH 446	Introduction to Time Series	3	
MATH 481	Intro to Stochastic Processes	3	
MATH 483	Design and Analysis of Exprmnt	3	
MATH 484	Regression	3	
Total Credit Hours			15

Computer Science

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10 W. 31st St.
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312.567.5150
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Interim Chair
Shlomo Argamon

Associate Chairs
Cynthia Hood
Bogdan Korel

Faculty with Research Interests
For information regarding faculty visit the Department of Computer Science website.

Computers have changed what we do and how we do it in our homes, in our offices, and throughout our world. The discipline of computer science focuses upon the many challenging problems encountered in the development and use of computing systems and software. Areas of study in computer science range from theoretical analyses into the nature of computing and computing algorithms, through the development of advanced computing devices and networks, to the design and implementation of sophisticated software systems.

The department offers two undergraduate programs in core computer science: a Bachelor of Science (B.S.) in Computer Science and Bachelor of Science (B.S.) in Computer Information Systems, as well as a Bachelor of Science (B.S.) in Artificial Intelligence.

Both core computer science programs provide an excellent background in the field and allow for ample study in other areas. Where these programs differ is in the approach they take to computer science. The B.S. in Computer Science provides an in-depth experience focusing on the theory and practice of computer science while the B.S. in Computer Information Systems provides a more interdisciplinary experience, balancing study in computer science with study in another field. Both programs begin with a set of introductory courses that work together to provide students with a firm foundation in computer science. These introductory courses include regular labs wherein students analyze and solve a variety of problems using accepted software development techniques. Having completed the introductory core, a student is prepared to work independently within a well-structured design and coding paradigm in the classroom or on the job.

The last two years of study build upon this foundation. The B.S. in Computer Science focuses on the concepts and techniques used in the design and development of advanced software systems. Students in this program explore the conceptual underpinnings of computer science—its fundamental algorithms, programming languages, database systems, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives including artificial intelligence, machine learning, biometrics, cloud computing, data mining, natural language processing, computer vision, computer graphics, information retrieval, information security, intelligent text analysis, knowledge management systems, and mobile application development, among others. As with the introductory sequence, these advanced courses stress “hands-on” learning by doing. Students can opt to complete one of the computer science specializations: data science, distributed and cloud computing, information security, or information and knowledge management systems. An allotment of free electives allows students to combine study in computer science with study in another field to complete a minor.

The B.S. in Computer Information Systems program emphasizes the use of computing for complex problem solving. Students in this program pursue an interdisciplinary course of study that combines a solid foundation in computer science with a focus in another discipline. This program is designed for students who seek to blend their computer science abilities with skills specific to another domain to solve problems in that domain. Examples include computing with a business focus (e.g., management information systems) or computing with a natural science focus (e.g., computational physics).

The B.S. in Artificial Intelligence (AI), one of the first degrees of its kind in the country, gives students the broad and deep foundations necessary to build computational systems that can interpret sensory input, learn from experience, understand human language, plan ahead, and support intelligent decision making. The program starts with introductory courses in programming, computer science, mathematics, and statistics that provide students with a firm technical foundation. Students are then prepared to learn core AI concepts and techniques including state-space search, game-playing, machine learning, neural networks, planning, computer vision, and language understanding. For breadth of understanding necessary in this interdisciplinary field, students choose from a diverse set of advanced courses in cognitive science, philosophy of mind, and linguistics, and also must complete a minor in another area. Given the societal impact of AI, emphasis is placed on ethics and social responsibility throughout the coursework. The program also includes a large variety of advanced AI electives to enable students to develop technical mastery in specific sub-fields.

The mission statement for the Department of Computer Science may be found on the Department of Computer Science website.

Degree Programs

Co-Terminal Options

The Department of Computer Science also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Applied Mathematics/Master of Computer Science
- Bachelor of Science in Applied Mathematics/Master of Science in Computer Science
- Bachelor of Science in Artificial Intelligence/Master of Artificial Intelligence
- Bachelor of Science in Artificial Intelligence/Master of Computer Science
- Bachelor of Science in Artificial Intelligence/Master of Cybersecurity
- Bachelor of Science in Artificial Intelligence/Master of Data Science
- Bachelor of Science in Artificial Intelligence/Master of Science in Computer Science
- Bachelor of Science in Artificial Intelligence/Master of Science in Computational Decision Sciences and Operations Research
- Bachelor of Science in Biology/Master of Computer Science
- Bachelor of Science in Biology/Master of Science in Computer Science
- Bachelor of Science in Computer Engineering/Master of Computer Science
- Bachelor of Science in Computer Engineering/Master of Science in Computer Science

- Bachelor of Science in Computer Science/Master of Artificial Intelligence
- Bachelor of Science in Computer Science/Master of Computer Science
- Bachelor of Science in Computer Science/Master of Cybersecurity
- Bachelor of Science in Computer Science/Master of Data Science
- Bachelor of Science in Computer Science/Master of Science in Applied Mathematics
- Bachelor of Science in Computer Science/Master of Science in Computer Science
- Bachelor of Science in Computer Science/Master of Science in Computational Decision Sciences and Operations Research
- Bachelor of Science in Computer Science/Master of Intellectual Property Management and Markets
- Bachelor of Science in Physics/Master of Computer Science
- Bachelor of Science in Physics/Master of Science in Computer Science

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Computer Science website (science.iit.edu/computer-science).

Minors

Bachelor of Science in Artificial Intelligence

Required Courses

Code	Title		Credit Hours
Artificial Intelligence Requirements			**(42)**
CS 100	Intro to the Profession		2
CS 115 & CS 116	Object-Oriented Programming I and Object-Oriented Programming II		4
or CS 201	Accelerated Intro to Cmptr Sci		
CS 330	Discrete Structures		3
CS 331	Data Structures and Algorithms		3
CS 340	Programming Paradigms/Patterns		3
CS 422	Data Mining		3
or CS 584	Machine Learning		
CS 425	Database Organization		3
CS 430	Introduction to Algorithms		3
CS 480	Introduction to Artificial Int		3
CS 481	Intllgnc Txt Analys Knwldg Mgm		3
CS 485	Computers and Society		3
CS 487	Software Engineering		3
Select one Artificial Intelligence Depth Course:			3
CS 512	Computer Vision	3	
CS 522	Advanced Data Mining	3	
CS 578	Interact/Trans Mach Learning	3	
CS 583	Probabilistic Graphical Models	3	
CS 584	Machine Learning	3	
CS 585	Natural Language Processing	3	
ECE 442	Internet of Things/Cyber Phys	3	
MATH 569	Statistical Learning	3	
MATH 574	Bayesian Computational Stats	3	
Select one Artificial Intelligence Breadth Course:			3
COM 301	Intro Linguistics	3	
PHIL 326	Philosophy of Language	3	
PSYC 423	Learning Theory	3	
PSYC 426	Cognitive Science	3	
Artificial Intelligence Technical Electives			**(9)**
Select a minimum of nine credit hours from the following:			9
CS 350	Cmptr Org&Asmbly Lang Prgmmg	3	
CS 351	Systems Programming	3	
CS 422	Data Mining	3	
CS 429	Information Retrieval	3	
CS 451	Parallel/Distributed Computing	3	
CS 458	Intro to Information Security	3	
Any CS 500-level course		3	
MATH 252	Introduction to Diff Equations	4	
MATH 350	Intro to Computational Mathe	3	
MATH 400	Real Analysis	3	
MATH 402	Complex Analysis	3	
MATH 481	Intro to Stochastic Processes	3	
MATH 483	Design and Analysis of Exprmnt	3	
MATH 484	Regression	3	
MATH 487	Mathematical Modeling II	3	

Minor Requirement			**(15)**
Select 15 credit hours in an area outside of computer science			15
Mathematics Requirements			**(23)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 332	Elementary Linear Algebra		3
MATH 474	Probability and Statistics		3
or MATH 475	Probability		
MATH 476	Statistics		3
or MATH 486	Mathematical Modeling I		
Science Requirements			**(11)**
Select one of the following science sequences:			8
PHYS 123 & PHYS 221	General Physics I: Mechanics and Gen Physics II: Elect&Magntism	8	
BIOL 107 & BIOL 109 & BIOL 115 & BIOL 117	General Biol Lecture and General Biology Lab and Human Biology and Human Biology Lab	8	
Select three credit hours of science electives [1]			3
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Total Credit Hours			127

1 Science electives (no lab required): Chosen from the natural sciences (biology, chemistry, material science, and physics), or courses marked with an (N) (natural science attribute) in the Undergraduate Bulletin. If the physics sequence is chosen, the remaining science elective cannot be a physics course. If the biology sequence is chosen, the remaining science elective cannot be a biology course.

Bachelor of Science in Artificial Intelligence Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 100	2	CS 116[1]	2
CS 115[1]	2	MATH 152	5
MATH 151	5	PHYS 123[2]	4
Humanities 200-level Course	3	Humanities Elective (300+)	3
Social Sciences Elective	3	Social Sciences Elective (300+)	3
	15		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 330	3	CS 340	3
CS 331	3	CS 430	3
MATH 251	4	MATH 332	3
PHYS 221[3]	4	Minor Elective	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
	17		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 425	3	CS 481	3
CS 480	3	CS 487	3
MATH 474	3	AI Technical Elective[4]	3
Minor Elective	3	Science Elective[5]	3
Humanities or Social Sciences Elective	3	Minor Elective	3
		IPRO Elective I	3
	15		18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 422	3	CS 485	3
AI Breadth Course[6]	3	AI Depth Course[7]	3
AI Technical Elective[4]	3	AI Technical Elective[4]	3
MATH 486	3	Minor Elective	3
Minor Elective	3	IPRO Elective II	3
	15		15

Total Credit Hours: 127

1 CS 201 is a one-semester, accelerated course equivalent to the two-semester CS 115/CS 116 sequence.

2 If completing the biology science sequence, students will take BIOL 115 and BIOL 117.

3 If completing the biology science sequence, students will take BIOL 107 and BIOL 109.

4 AI technical electives may be chosen from the following: CS 350, CS 351, CS 422, CS 429, CS 451, CS 458, any CS 500-level course, MATH 252, MATH 350, MATH 400, MATH 402, MATH 481, MATH 483, MATH 484, or MATH 487.

5 Science electives (no lab required): Chosen from the natural sciences (biology, chemistry, material science, and physics), or courses marked with an (N) (natural science attribute) in the Undergraduate Bulletin. If the physics sequence is chosen, the remaining science elective cannot be a physics course. If the biology sequence is chosen, the remaining science elective cannot be a biology course.

6 AI breadth course must be COM 301, PHIL 326, PHIL 342, PSYC 423, or PSYC 426.

7 AI depth course must be: CS 512, CS 522, CS 578, CS 583, CS 584, CS 585, ECE 442, MATH 569, or MATH 574.

Bachelor of Science in Computer Information Systems

Required Courses

Code	Title	Credit Hours
Computer Science Requirements		**(18)**
CS 100	Intro to the Profession	2
CS 115	Object-Oriented Programming I	2
CS 116	Object-Oriented Programming II	2
CS 330	Discrete Structures	3
CS 331	Data Structures and Algorithms	3
CS 350	Cmptr Org&Asmbly Lang Prgmmg	3
CS 351	Systems Programming	3
Computer Science Technical Electives		**(15)**
Select 15 credit hours [1]		15
Computer Science Electives		**(6)**
Select six credit hours		6
Mathematics Requirement		**(5)**
MATH 151	Calculus I	5
Mathematics Elective		**(3)**
Select three credit hours		3
Science Requirements		**(11)**
BIOL 105	Introduction to Biology	3
or BIOL 114	Introduction to Human Biology	
CHEM 124	Princ of Chemistry I with Lab	4
PHYS 123	General Physics I: Mechanics	4
Science Elective		**(3)**
Select three credit hours		3
Psychology Requirements		**(6)**
PSYC 221	Intro to Psychological Science	3
PSYC 301	Industrial Psychology	3
Political Science Requirement		**(3)**
Select three credit hours [2]		3
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Minor Electives		**(15)**
Select 15 credit hours		15
Free Electives		**(15)**
Select 15 credit hours		15
Total Credit Hours		127

1. Computer science technical electives are designated with a (T) in the course descriptions.
2. Any 200-level political science course.

Bachelor of Science in Computer Information Systems Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 100	2	CS 116	2
CS 115	2	BIOL 105 or 114	3
MATH 151	5	Mathematics Elective	3
PSYC 221	3	Humanities or Social Sciences Elective	3
Humanities 200-level Course	3	Social Sciences Elective	3
	15		14

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 330	3	CS 350	3
CS 331	3	PHYS 123	4
CHEM 124	4	Minor Elective	3
Political Science Course[1]	3	Computer Science Elective	3
Humanities Elective (300+)	3	Computer Science Technical Elective[2]	3
	16		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 351	3	PSYC 301	3
Minor Elective	3	IPRO Elective I	3
Science Elective	3	Minor Elective	3
Social Sciences Elective (300+)	3	Computer Science Technical Elective[2]	3
Free Elective	3	Humanities Elective (300+)	3
		Free Elective	3
	15		18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
Minor Elective	3	IPRO Elective II	3
Computer Science Elective	3	Minor Elective	3
Computer Science Technical Elective[2]	3	Computer Science Technical Elective[2]	3
Computer Science Technical Elective[2]	3	Free Elective	3
Social Sciences Elective (300+)	3	Free Elective	3
Free Elective	3		
	18		15

Total Credit Hours: 127

1. Any 200-level political science course
2. Computer science technical electives are designated with a (T) in the course descriptions.

Specializations in Computer Science

Students in the CIS program may elect to complete one of these specializations by choosing their computer science electives and free electives appropriately, or by taking extra classes. The student must receive department approval and notify the Office of Undergraduate Academic Affairs. A minimum of four courses are required for a specialization.

Computer Science Honors Research

A minimum of 13 credit hours are required for this specialization.

Code	Title	Credit Hours
CS 492	Intro to Computer Sci Research	1
CS 491	Undergraduate Research	6
or CS 497	Special Projects	
Graduate Computer Science Electives [2]		6

[1] Students will be required to take CS 492 in their first or second year.

[2] Students must take at least two adviser approved 500-level computer science courses.

Data Science

A minimum of four courses are required for this specialization.

Code	Title	Credit Hours
BUS 371	Marketing Fundamentals	3
CS 422	Data Mining	3
or CS 584	Machine Learning	
CS 451	Parallel/Distributed Computing	3
MATH 481	Intro to Stochastic Processes	3
or MATH 483	Design and Analysis of Exprmnt	

Note: MATH 481 has prerequisites of MATH 332 or MATH 333 and MATH 475; MATH 483 has a prerequisite of MATH 476.

Distributed and Cloud Computing

A minimum of four courses are required for this specialization.

Code	Title	Credit Hours
CS 442	Mobile Application Development	3
or CS 447	Distributed Objects	
CS 451	Parallel/Distributed Computing	3
CS 455	Data Communication	3
CS 553	Cloud Computing	3

Information and Knowledge Management Systems

A minimum of four courses are required for this specialization.

Code	Title		Credit Hours
CS 425	Database Organization		3
CS 482	Infor Knwldg Mgmt Syst		3
Select a minimum of two courses from the following:			6
CS 422	Data Mining	3	
CS 429	Information Retrieval	3	
CS 481	Intllgnc Txt Analys Knwldg Mgm	3	
CS 585	Natural Language Processing	3	

Information Security

A minimum of four courses are required for this specialization.

Code	Title	Credit Hours
CS 425	Database Organization	3
CS 458	Intro to Information Security	3
CS 455	Data Communication	3
CS 549	Cryptography	3
or CS 558	Advanced Computer Security	

Bachelor of Science in Computer Science

Required Courses

Code	Title		Credit Hours
Computer Science Requirements			**(36)**
CS 100	Intro to the Profession		2
CS 115	Object-Oriented Programming I		2
CS 116	Object-Oriented Programming II [1]		2
CS 330	Discrete Structures		3
CS 331	Data Structures and Algorithms		3
CS 350	Cmptr Org&Asmbly Lang Prgmmg		3
CS 351	Systems Programming		3
CS 425	Database Organization		3
CS 430	Introduction to Algorithms		3
CS 440	Prgmng Languages Translators		3
CS 450	Operating Systems		3
CS 485	Computers and Society		3
CS 487	Software Engineering		3
Computer Science Electives			**(12)**
Select 12 credit hours [2]			12
Mathematics Requirements			**(20)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 332	Elementary Linear Algebra		3
or MATH 333	Matrix Alg & Complex Variables		
MATH 474	Probability and Statistics		3
or MATH 475	Probability		
Mathematics Elective			**(3)**
Select one of the following:			3
MATH 252	Introduction to Diff Equations	4	
MATH 350	Intro to Computational Mathe	3	
MATH 380	Intro to Mathematical Modeling	3	
MATH 410	Number Theory	3	
MATH 435	Linear Optimization	3	
MATH 453	Combinatorics	3	
MATH 454	Graph Theory and Applications	3	
MATH 476	Statistics	3	
MATH 481	Intro to Stochastic Processes	3	
Science Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
Science Electives			**(6)**
Select six credit hours [3]			6
Communication Elective			**(3)**
Select one of the following:			3
COM 421	Technical Communication	3	
COM 424	Document Design	3	
COM 425	Editing	3	
COM 428	Verbal Visual Communications	3	
COM 435	Intercultural Communication	3	
Interprofessional Projects (IPRO)			**(6)**

See Illinois Tech Core Curriculum, section E (p. 25)	6
Humanities and Social Sciences Requirements	**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)	21
Free Electives	**(12)**
Select 12 credit hours	12
Total Credit Hours	127

[1] CS 201 is a one-semester, accelerated course equivalent to the two-semester CS 115/CS 116 sequence.

[2] Computer science electives: Any computer science course at the 300-level or higher (including graduate CS courses) may be used as a computer science elective, except CS 401 and CS 402. ECE 218 and ECE 441 may also be used as computer science electives. Higher mathematics or computational science courses at the 300-level or above can also be used as computer science electives, with CS department approval. Students pursuing the data science specialization may only apply the two required computer science courses toward this requirement.

[3] Science electives (no lab required): Chosen from the natural sciences (biology, chemistry, material science, and physics), or courses marked with an (N) (natural science attribute) in the Undergraduate Bulletin. At least one course must be in a field other than physics.

The Bachelor of Science in Computer Science degree is accredited by:

Computing Accreditation Commission of ABET
415 N. Charles Street
Baltimore, MD 21201
telephone: 410.347.7700

Bachelor of Science in Computer Science Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 100	2	CS 116[1]	2
CS 115[1]	2	MATH 152	5
MATH 151	5	PHYS 123	4
Humanities 200-level Course	3	Humanities Elective (300+)	3
Social Sciences Elective	3	Social Sciences Elective (300+)	3
	15		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 330	3	CS 350	3
CS 331	3	CS 425	3
MATH 251	4	MATH 332 or 333	3
PHYS 221	4	Humanities Elective (300+)	3
Social Sciences Elective (300+)	3	Science Elective[2]	3
	17		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 351	3	CS 430	3
CS 440	3	CS 450	3
MATH 474 or 475	3	IPRO Elective I	3
Communication Elective[3]	3	Mathematics Elective	3
Computer Science Elective[4]	3	Free Elective	3
	15		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
CS 487	3	CS 485	3
IPRO Elective II	3	Computer Science Elective[4]	3
Computer Science Elective[4]	3	Computer Science Elective[4]	3
Science Elective[2]	3	Free Elective	3
Humanities or Social Sciences Elective	3	Free Elective	3
Free Elective	3		
	18		15

Total Credit Hours: 127

1 CS 201 is a one-semester, accelerated course equivalent to the two-semester CS 115/CS 116 sequence.

2 Science electives (no lab required): Chosen from the natural sciences (biology, chemistry, material science, and physics), or courses marked with an (N) (natural science attribute) in the Undergraduate Bulletin. At least one course must be in a field other than physics.

3 Communication elective must be COM 421, COM 424, COM 425, COM 428, or COM 435.

4 Computer science electives: Any computer science course at the 300-level or higher (including graduate CS courses) may be used as a computer science elective, except CS 401 and CS 402. ECE 218 and ECE 441 may also be used as computer science electives. Higher mathematics or computational science courses at the 300-level or above can also be used as computer science electives, with CS department approval.

Specializations in Computer Science

Students in the CS program may elect to complete one of these specializations by choosing their computer science electives and free electives appropriately, or by taking extra classes. The student must receive department approval and notify the Office of Undergraduate Academic Affairs. A minimum of four courses are required for a specialization.

Computer Science Honors Research

A minimum of 13 credit hours are required for this specialization.

Code	Title	Credit Hours
CS 492	Intro to Computer Sci Research [1]	1
CS 491	Undergraduate Research [2]	6
or CS 497	Special Projects	
Graduate Computer Science Electives [3]		6

1. Students will be required to take CS 492 in their first or second year.
2. Students must complete an ambitious research project and associated honors thesis, advised by a computer science faculty member. The thesis/project culminates in a presentation to a committee for approval in their last semester (six credit hours of CS 491 or CS 497).
3. Students must take at least two adviser approved 500-level computer science courses.

Data Science

A minimum of four courses are required for this specialization. Only two courses may be applied as computer science electives.

Code	Title	Credit Hours
BUS 371	Marketing Fundamentals	3
CS 422	Data Mining	3
or CS 584	Machine Learning	
CS 451	Parallel/Distributed Computing	3
MATH 481	Intro to Stochastic Processes	3
or MATH 483	Design and Analysis of Exprmnt	

Note: MATH 481 has prerequisites of MATH 332 or MATH 333 and MATH 475; MATH 483 has a prerequisite of MATH 476.

Distributed and Cloud Computing

A minimum of four courses are required for this specialization.

Code	Title	Credit Hours
CS 442	Mobile Application Development	3
or CS 447	Distributed Objects	
CS 451	Parallel/Distributed Computing	3
CS 455	Data Communication	3
CS 553	Cloud Computing	3

Information and Knowledge Management Systems

A minimum of four courses are required for this specialization.

Code	Title		Credit Hours
CS 425	Database Organization		3
CS 482	Infor Knwldg Mgmt Syst		3
Select a minimum of two courses from the following:			6
CS 422	Data Mining	3	
CS 429	Information Retrieval	3	
CS 481	Intllgnc Txt Analys Knwldg Mgm	3	
CS 585	Natural Language Processing	3	

Information Security

A minimum of four courses are required for this specialization.

Code	Title	Credit Hours
CS 425	Database Organization	3
CS 458	Intro to Information Security	3
CS 455	Data Communication	3
CS 549	Cryptography	3
or CS 558	Advanced Computer Security	

Minor in Artificial Intelligence

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
CS 422	Data Mining	3
CS 429	Information Retrieval	3
CS 480	Introduction to Artificial Int	3
Total Credit Hours		16

A maximum of three courses may be shared between the Artificial Intelligence minor and the Computational Structures minor.

Minor in Computational Structures

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 330	Discrete Structures	3
CS 331	Data Structures and Algorithms	3
CS 430	Introduction to Algorithms	3
MATH 350	Intro to Computational Mathe	3
Total Credit Hours		16

A maximum of three courses may be shared between the Artificial Intelligence minor and the Computational Structures minor.

Minor in Computer Architecture

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
CS 350	Cmptr Org&Asmbly Lang Prgmmg	3
CS 470	Computer Architecture	3
ECE 218	Digital Systems	4
Total Credit Hours		17

Minor in Computer Networking

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
CS 350	Cmptr Org&Asmbly Lang Prgmmg	3
CS 450	Operating Systems	3
CS 455	Data Communication	3
Total Credit Hours		16

Minor in Computer Science

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
Three 300-level or 400-level computer science courses chosen in consultation with the Department of Computer Science		9
Total Credit Hours		16

Minor in Database Management

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
CS 422	Data Mining	3
or CS 429	Information Retrieval	
CS 425	Database Organization	3
CS 445	Objct Orntd Dsgn Prgmng	3
Total Credit Hours		16

Minor in Operating Systems

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
CS 350	Cmptr Org&Asmbly Lang Prgmmg	3
CS 351	Systems Programming	3
CS 450	Operating Systems	3
Total Credit Hours		16

Minor in Programming Languages

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
CS 350	Cmptr Org&Asmbly Lang Prgmmg	3
CS 351	Systems Programming	3
CS 440	Prgmng Languages Translators	3
Total Credit Hours		16

Minor in Software Engineering

Required Courses

Code	Title	Credit Hours
CS 201	Accelerated Intro to Cmptr Sci	4
CS 331	Data Structures and Algorithms	3
CS 442	Mobile Application Development	3
CS 445	Objct Orntd Dsgn Prgmng	3
CS 487	Software Engineering	3
Total Credit Hours		16

Industrial Technology and Management

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Director
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Director of Operations
Pamela Houser

Faculty Research/Student Projects
For information on faculty and student research projects, visit the Industrial Technology and Management website.

The Bachelor of Industrial Technology and Management (BINTM) program is designed to prepare skilled adults for managerial positions in industry. This is a completion program for working individuals who have technical education in industrial specialties, including manufacturing, supply chain/logistics, construction, facilities maintenance/management, and other related areas. The program enables students to build upon existing skills, improve their managerial capabilities, and thereby expand their career opportunities.

Educational outcomes of the BINTM program include:

- Understand best practices in industry and methods of implementation
- Identify and evaluate significant factors and issues affecting managerial decision-making
- Ability to assume a leadership role and a higher level of professional responsibility
- Understand how to address a wide range of operational and situational challenges
- Understand how to employ various technologies to achieve efficient operations
- Understand the importance of ethical and sustainable industrial operations
- Understand the dynamics of the global industrial landscape
- Communicate effectively at all levels, in an objective and professional manner
- Ability to function on multidisciplinary teams

The program offers five professional specializations: Construction Technology (CT), Facilities Management (FM), Industrial Sustainability (ST), Manufacturing Technology (MT), and Supply Chain Management (SCM). Students have the option to complete a specialization or take courses from more than one specialization area as electives. The core curriculum covers material applicable to all industrial sectors. This approach allows students to optimize course selection to suit individual career objectives.

The ideal candidate for this program is a person who is already working within, or has strong interest in, a career in industry or a related field. This curriculum provides a broad knowledge base which gives students the flexibility to advance within a chosen technical specialty or to move into a related career at a professional or management level.

Admission to the program is based on a review of college transcripts plus consideration of work experience and career goals. In general, 60 credit hours from an accredited college are needed for admission (only courses graded "C" or better are accepted for transfer). Those who have accrued at least 45 credit hours towards admission requirements may be admitted with the condition that all remaining requirements be completed within two years of starting the program. Candidates with more than 60 credit hours of transferable credit may qualify to have excess credit applied towards BINTM coursework.

To accommodate full-time work schedules, courses are offered evenings and Saturdays at the university's Mies Campus in Chicago, and via the Internet for students who are unable to attend live classes.

A three-course INTM certificate program is available for individuals interested in improving managerial and decision-making skills. The courses are part of the regular curriculum and can be applied toward the BINTM degree.

Degree Program

- Bachelor of Industrial Technology and Management (p. 152)

Co-Terminal Options

Industrial Technology and Management students have the option to pursue a co-terminal degree, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Industrial Technology and Management/Master of Industrial Technology and Operations

The co-terminal degree allows students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Industrial Technology and Management website (appliedtech.iit.edu/industrial-technology-and-management).

Minors

- Minor in Industrial Technology and Management (p. 156)
- Minor in Supply Chain Management (p. 156)

Certificate in Industrial Technology and Management

The three-course INTM certificate provides an introduction to industrial organizations and how they operate.

Certificate students should have at least two years of work experience and some college credit in industrial subjects. **This certificate does not qualify for federal financial aid.**

Students must complete the following courses:

Code	Title	Credit Hours
INTM 315	Industrial Enterprises	3
INTM 322	Ind Project Management	3
INTM 410	Operations Management	3

Bachelor of Industrial Technology and Management

Admission Requirements

Candidates must complete an application for undergraduate admission and submit official transcripts from all colleges attended. The BINTM program nominally requires the transfer of 60 credit hours as outlined in the following admission requirements:

Mathematics [1]

Five to six credit hours at the level of MATH 119 (at IIT) or above. Statistics highly recommended. Technical mathematics is also accepted. See Illinois Tech Core Curriculum, section D (p. 25).

Natural Science [1]

10 to 11 credit hours of science or engineering courses. Relevant courses include physics, chemistry, or biology (physics highly recommended). Up to six credit hours may be in engineering graphics/drafting/CAD. Two sequential courses must be completed in a single field and the third course must be in a different field. In certain cases, technology courses may satisfy requirement. See Illinois Tech Core Curriculum, section D (p. 25).

Computer Science

Three credit hours of computer literacy/programming.

Humanities and Social Sciences

Nine credit hours. Humanities courses include literature, philosophy (except logic), and history. Social sciences typically include anthropology, geography, political science, psychology, sociology, and economics (recommended). A minimum of three credit hours in humanities and three credit hours in social sciences is required.

Technical Coursework

31 credit hours. (Candidates with adequate college credit but lacking the technical coursework may qualify for admission based on a strong interest and/or relevant industrial experience.)

1 A minimum 16 credit hours is required between mathematics and natural science or engineering.

Required Courses

A total of 126 semester hours are required for the bachelor’s degree, consisting of 66 credit hours (22 courses) of junior- and senior-level courses completed at Illinois Institute of Technology and the 60 transfer credit hours required for admission. Students may attend on a part-time or full-time basis, understanding that INTM courses are generally offered evenings to accommodate full-time work schedules of students.

The core curriculum (15 courses) emphasizes proficiency in the essential functions of industrial enterprises with a focus on management-related topics. This coursework includes upper-level humanities and social sciences electives and two Interprofessional Projects (IPRO). In addition, students complete seven electives, generally consisting of three technical electives and four specialization electives. Electives provide in-depth coverage of specific aspects of industrial organizations and their related sectors. Students choose elective courses based on career goals and personal interests, and have the option to complete a formal specialization by taking four courses within one specialty area.

Bachelor of Industrial Technology and Management Requirements

Code	Title	Credit Hours
Admission Transfer Requirements		**(60)**
Details listed under Admission Requirements		60
Industrial Technology Requirements		**(27)**
INTM 301	Communications for Workplace	3
INTM 315	Industrial Enterprises	3
INTM 322	Ind Project Management	3
INTM 404	Marketing, Sales, & Prod Intro	3
INTM 408	Cost Management	3
INTM 410	Operations Management	3
INTM 425	Human Resrcs Management	3
INTM 441	Supply Chain Management	3
INTM 459	Issues in Ind Sustainability	3
INTM Electives (Technical and/or Specialization)		**(21)**
Select 21 credit hours [1]		21
Humanities Electives		**(6)**
300/400-level courses		6
Social Sciences Electives		**(6)**
300/400-level courses		6
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Total Credit Hours		126

[1] See Specializations tab for industrial technology and management specializations. INTM technical electives are specified on this page.

Technical Electives

Code	Title	Credit Hours
INTM 319	Electronics in Industry	3
INTM 418	Industrial Risk Management	3
INTM 420	Applied Strategies Competitive	3
INTM 427	E-Commerce in Mkt/Supply Chain	3
INTM 477	Entrepreneurship Industry	3

Bachelor of Industrial Technology and Management Curriculum

A suggested program based on half-time attendance. Students may complete coursework at their own pace.

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
INTM 301	3	INTM 322	3
INTM 315	3	INTM Elective	3
INTM 404	3	INTM Elective	3
	9		9
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
INTM 410	3	INTM 425	3
INTM Elective	3	INTM Elective	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	9		9
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
INTM 459	3	INTM 441	3
INTM Elective	3	INTM Elective	3
IPRO Elective I	3	Social Sciences Elective (300+)	3
	9		9
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
INTM 408	3	IPRO Elective II	3
Humanities Elective (300+)	3	INTM Elective	3
	6		6

Total Credit Hours: 66

Industrial Technology and Management Curriculum Specializations

Five industrial specializations are available. To earn a specialization, the student must complete four courses within an identified focus area.

Construction Technology (CT)

Covers construction technology, estimating, project management, and contract administration.

Code	Title	Credit Hours
INTM 407	Construction Technology	3
INTM 413	Contract Admn for Construction	3
INTM 415	Advncd Project Mgmt	3
INTM 417	Construction Estimating	3
Total Credit Hours		12

Facilities Management (FM)

Covers facilities operations and maintenance (O&M), the role and responsibilities of the facilities manager, integration of new technologies, energy efficiency in buildings, and activities required for LEED certification.

Code	Title	Credit Hours
Select four courses from the following:		12
INTM 405	Maintenance Tech and Mgmt	3
INTM 411	Functional Facilities Mgmt	3
INTM 413	Contract Admn for Construction	3
INTM 415	Advncd Project Mgmt	3
INTM 416	Integrated Facilities Mgmt	3
INTM 423	Sustainable Facilities Ops	3
Total Credit Hours		12

Industrial Sustainability (ST)

Covers a range of issues in industrial sustainability, critical material resources, and alternative energies.

Code	Title	Credit Hours
INTM 423	Sustainable Facilities Ops	3
INTM 460	Sustainability Critical Matrls	3
INTM 461	Energy Options for Industry	3
INTM 462	Special Topics Sustainability	3
Total Credit Hours		12

Manufacturing Technology (MT)

Covers advanced technologies, process optimization, automation, quality control, and information systems.

Code	Title	Credit Hours
Select four courses from the following:		12
INTM 406	Quality Management Systems	3
INTM 434	Manufacturing 4.0	3
INTM 435	Perf Mgmt in Food Operations	3
INTM 436	Lean Manufacturing	3
INTM 437	Smart Factory Automation	3
INTM 438	Advanced Metals Mfg I	3
INTM 446	Manufacturing & Logistics Info	3
Total Credit Hours		12

Supply Chain Management (SCM)

Covers strategic supply chain management, inventory, information systems, warehousing and distribution, purchasing, transportation, and export/import activities.

Code	Title	Credit Hours
Select four courses from the following:		12
INTM 409	Inventory Control	3
INTM 427	E-Commerce in Mkt/Supply Chain	3
INTM 430	Transportation	3
INTM 442	Warehousing and Distribution	3
INTM 443	Purchasing	3
INTM 444	Export/Import	3
INTM 446	Manufacturing & Logistics Info	3
Total Credit Hours		12

Minor in Industrial Technology and Management

Required Courses

Code	Title		Credit Hours
Choose 15 credit hours from the following:			15
INTM 315	Industrial Enterprises	3	
INTM 322	Ind Project Management	3	
INTM 410	Operations Management	3	
INTM 418	Industrial Risk Management	3	
INTM 420	Applied Strategies Competitive	3	
INTM 441	Supply Chain Management	3	
INTM 477	Entrepreneurship Industry	3	
Total Credit Hours			15

Minor in Supply Chain Management

Required Courses

Code	Title		Credit Hours
INTM 441	Supply Chain Management		3
INTM 446	Manufacturing & Logistics Info		3
Select a minimum of three courses from the following:			9
INTM 409	Inventory Control	3	
INTM 427	E-Commerce in Mkt/Supply Chain	3	
INTM 430	Transportation	3	
INTM 432	Sales and Operations Planning	3	
INTM 442	Warehousing and Distribution	3	
INTM 443	Purchasing	3	
INTM 444	Export/Import	3	
Total Credit Hours			15

Information Technology and Management

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Dean and Chair
C. Robert Carlson

Associate Chair and Director of Undergraduate Advising
Ray Trygstad

Faculty with Research Interests
For information regarding faculty visit the Department of Information Technology and Management website.

The objective of the Bachelor of Information Technology and Management degree is to produce graduates prepared for a career in the information technology field, while equipping them with the critical thinking skills necessary to cope with the emergence of new technologies and with management principles needed to advance in their careers. While the program was originally designed for students who have achieved an associate's degree and would like to complete a bachelor's degree, students may also enter the program as first-year students. The Bachelor of Information Technology and Management degree is accredited by the Computing Accreditation Commission of ABET (abet.org). Bachelor of science degrees give students the mathematical grounding necessary to prepare them for further research-focused graduate studies.

Government studies such as Free and Aspray: *The Supply of Information Technology Workers in the United States*, show that technology positions will be the fastest growing segment in the United States for the next 30 years. Organizations of all kinds have become dependent on networked computing infrastructure as the key element to enabling modern business processes, and our graduates are prepared to select, manage, and maintain that infrastructure, ensuring that it meets organizational needs. Information technology professionals assume responsibility for selecting hardware and software products appropriate for an organization, integrating those products with organizational needs and infrastructure, and installing, customizing, and maintaining those applications for the organization's computer users. Planning and managing an organization's technology infrastructure is a difficult and complex job that requires a solid foundation in applied computing as well as management and people skills. Professionals in this discipline require special skills, such as understanding how networked systems are composed and structured and what their strengths and weaknesses are, and being prepared to deal with important software systems concerns such as reliability, security, usability, and effectiveness and efficiency for their intended purpose. These topics are difficult and intellectually demanding.

The Bachelor of Information Technology and Management degree produces graduates who are able to:

- Problem solve, create, and effectively communicate innovative answers to provide technology solutions for the problems of business, industry, government, non-profit organizations, and individuals
- Perform requirements analysis, design and administration of computer and network-based systems conforming to policy and best practices, and monitor and support continuing development of relevant policy and best practices as appropriate
- Apply current technical and mathematical concepts and practices in the core information technologies and recognize the need to engage in continuing professional development

To meet these goals, graduates must demonstrate knowledge and proficiency in these areas:

- Information technology basics including hardware and operating systems
- Application development and programming
- Human-computer interaction
- Databases and data management
- Networking and communications
- Websystems
- Cybersecurity
- Professionalism

Bachelor of Information Technology and Management students are required to complete a minor. The minor may be in a field which will complement information technology such as business or professional and technical communication, or may be chosen from a field very different such as history or sociology to provide a more widely rounded educational experience.

The Bachelor of Science in Applied Cybersecurity and Information Technology degree produces graduates who are able to:

- Problem solve, create, and effectively communicate innovative answers to provide technology solutions for the problems of business, industry, government, non-profit organizations, and individuals
- Perform requirements analysis, design and administration of computer and network-based systems conforming to policy and best practices, and monitor and support continuing development of relevant policy and best practices as appropriate
- Design and implement an enterprise security program using both policy and technology to implement technical, operational, and managerial controls, which will technically secure enterprise information assets and resources to deter, detect, and prevent the success of attacks and intrusions
- Investigate information security incidents and violation of law using computer resources in a manner such that all evidence is admissible in a court of law
- Apply current technical and mathematical concepts and practices in the core information technologies and recognize the need to engage in continuing professional development

To meet these goals, in addition to the knowledge and proficiency expected of graduates in Information Technology and Management, cybersecurity graduates must complete 33 hours of coursework in computing and cybersecurity that must cover application of the crosscutting concepts of confidentiality, integrity, availability, risk, and adversarial thinking, as well as fundamental topics from the following areas:

- Information Security
- Software Security
- System Security
- Human Security
- Organizational Security
- Societal Security

Admission for transfer students is based on a review of college transcripts and documentation of work experience. Applicants must submit an application for admission as a degree-seeking student. Transfer applicants must hold an associate's degree (A.A.) from an accredited college or the equivalent (completion of at least 55 credit hours). Only courses in which the student has earned a grade of "C" or better may be accepted for transfer. Supporting documentation to be included with the application includes official transcripts of all college-level work.

Illinois Tech/College of DuPage and Illinois Tech/Joliet Junior College Dual Admissions Programs

Students who meet the requirements of the Dual Admissions Program (DAP) may enroll simultaneously at the College of DuPage (COD) or Joliet Junior College (JJC) and Illinois Institute of Technology. Students accepted into the DAP will have access to advising and other services from both institutions. Students who successfully complete the institutional course requirements of both institutions under the DAP will be awarded an associate's degree from COD or JJC and a Bachelor of Information Technology and Management from Illinois Institute of Technology.

Eligibility for the Program

Students applying to the DAP must be enrolled in one of the following programs:

At COD: Associate of Applied Science in Computer Information Systems or Associate of Applied Science in Computer Internetworking Technologies

At JJC: Associate of Applied Science in Computer Information Systems; Network Specialist, Programming, or Web Design and Administration options

Students must have and maintain a cumulative GPA of at least 3.00 at COD or JJC to be eligible for admission to Illinois Tech. Students must make satisfactory academic progress at COD, as defined by COD, or at JJC, as defined by JJC.

Application Process

Applicants must complete a Statement of Intent Form, which permits the exchange of academic admission and advising information between Illinois Tech and COD or JJC. Applicants must also complete the application process at both COD or JJC and Illinois Tech in order to be admitted to both institutions. The Illinois Tech application may be submitted only for a Bachelor in Information Technology and Management. Admission to other Illinois Tech programs may have additional requirements that are outside the scope of the program.

Academic Program Requirements

Students must follow each institution's policies regarding admission, course enrollment, transfer hours, probation, dismissal, and reinstatement. Transcripts must be sent to the Illinois Tech Office of Undergraduate Academic Affairs each semester for each student attending COD or JJC and enrolled in the DAP. Illinois Tech will provide COD and JJC with major and course updates, course prerequisites, and program requirements for the information technology and management bachelor's degree completion program.

Graduation Requirements

Students enrolled in the DAP must follow the COD or JJC catalog to satisfy requirements for the associate's degree and the requirements set out in the Illinois Tech Undergraduate Bulletin in effect at the time of admission into the DAP for the bachelor's degree.

The Center for Cyber Security and Forensics Education

The Center for Cyber Security and Forensics Education (C^2SAFE) is a multi-disciplinary center within the School of Applied Technology. The objectives of the Center for Cyber Security and Forensics Education are to:

- Develop, promote, and support education and research in cybersecurity technologies and management, information assurance, and digital forensics across all academic disciplines at Illinois Institute of Technology
- Engage with business and industry, government, professional associations, and community colleges to enhance knowledge, awareness, and education in cybersecurity and digital forensics and improve practices in information assurance
- Coordinate the designation of Illinois Institute of Technology as a National Center of Academic Excellence in Cyber Defense Education
- Maintain resources for education and research in cybersecurity and digital forensics, publish student and faculty research in the field, and sponsor, organize, and conduct conferences and other events to promote and advance cyber security and forensics education
- Support the university's academic departments in the delivery of the highest caliber of cyber security and digital forensics education

The center plans, organizes, and conducts the annual ForenSecure conference in the spring of each year, as well as additional activities and student competitions that advance the mission of the center.

The center actively cooperates and coordinates activities with agencies of the federal government and with professional organizations and programs such as the Information Systems Security Association (ISSA), the Information Systems Audit and Control Association (ISACA), the Association of Information Technology Professionals (AITP), the Association for Computing Machinery (ACM), the Institute of Electrical and Electronic Engineers (IEEE), UNIFORUM, CompTIA, Infragard, and others. The center makes every effort to engage in joint activities with these organizations and to encourage them to engage with the center whenever possible.

Illinois Institute of Technology has been designated as a National Center of Academic Excellence in Cyber Defense Education by the National Security Agency and the U.S. Department of Homeland Security. This designation results from meeting stringent Center of Academic Excellence criteria and mapping of information technology and management curricula to a core set of cyber defense knowledge units. Students attending Center of Academic Excellence in Cyber Defense Education institutions are eligible to apply for scholarships and grants through the Department of Defense Information Assurance Scholarship Program and the Federal Cyber Service Scholarship for Service Program. This designation reflects Illinois Institute of Technology's commitment to producing professionals with cyber defense expertise for the nation.

Resources for education and research as well as published student and faculty research in the form of technical reports and white papers are available on the center's website (appliedtech.iit.edu/c2safe).

Degree Programs

- Bachelor of Information Technology and Management (p. 161)
- Bachelor of Information Technology and Management: Transfer Program (p. 165)
- Bachelor of Science in Applied Cybersecurity and Information Technology (p. 170)

Co-Terminal Options

The Department of Information Technology and Management also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Information Technology and Management/Master of Cyber Forensics and Security
- Bachelor of Information Technology and Management/Master of Information Technology and Management

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Information Technology and Management website (appliedtech.iit.edu/information-technology-and-management).

Minors

Bachelor of Information Technology and Management

Program for First-Year Students

All students must complete a minimum of 36 credit hours of courses with a significant written and oral communication component, identified with a (C) in the bulletin; 12 credit hours of (C)-coded courses must be taken in the major.

ITM students are required to complete a minor and are strongly encouraged to consider minors which complement their primary program of study; these include (but are not limited to) business, industrial technology, professional and technical communications, circuits and systems, computer architecture, and ROTC. Courses taken to fulfill a minor requirement may not also be used as electives in the major. The minor requirement may be waived for students entering as transfer students or who change their major to information technology and management after completion of 30 credit hours of studies at the university.

A maximum of nine credit hours of ITM graduate courses taken as an undergraduate may be applied to the Master of Information Technology and Management degree, and any graduate courses taken to fulfill undergraduate degree requirements may not also be applied to a graduate degree unless the student is enrolled in a co-terminal or accelerated master's degree program.

Required Courses

Code	Title		Credit Hours
ITM Requirements			**(39)**
ITM 100	Intro to IT as a Profession		3
ITM 301	Intro OS and Hardware I		3
ITM 311	Intro to Software Development		3
ITM 313	Intro to Open Source App Dev		3
or ITM 312	Intro Systems Sftwr Prgmng		
ITMD 321	Data Modeling and Applications		3
ITMD 361	Fund of Web Development		3
ITMD 362	Human-Computer Interaction		3
ITMD 411	Intermediate Software Devlpmnt		3
ITMM 471	Project Management for ITM		3
ITMO 340	Intro Data Networks & Internet		3
ITMO 356	Intro Open Source OS		3
ITMS 448	Cyber Security Technologies		3
ITMT 430	System Integration		3
ITM Electives			**(18)**
Select 18 credit hours from ITM, ITMD, ITMM, ITMO, ITMS, ITMT, and TECH			18
Mathematics Requirements			**(6)**
MATH 180	Fundamentals of Discrete Math		3
or MATH 230	Introduction to Discrete Math		
Select one course from the following:			3
BUS 221	Business Statistics	3	
PSYC 203	Undergrad Stats Bhvrl Sci	4	
MATH 425	Statistical Methods	3	
Natural Science and Engineering Requirements			**(10)**
EG 225 is recommended			
See Illinois Tech Core Curriculum, section D (p. 25)			10
Humanities and Social Sciences Requirements			**(21)**
PSYC 301 is recommended			
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Minor Electives			**(15)**
Select 15 credit hours			15
Free Electives			**(12)**

Select 12 credit hours	12
Total Credit Hours	127

Bachelor of Information Technology and Management (Program for First-Year Students) Curriculum

Students should be aware that students not completing 30 credit hours of study in their first year will still be classified as a first-year student in the first semester of their second year of study, which may adversely impact some financial aid. Students with issues or questions about this should discuss it with a financial aid counselor.

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ITM 301	3	ITM 311	3
ITMD 321	3	ITMO 340	3
Natural Science or Engineering Elective	4	MATH 180 or 230	3
Humanities 200-level Elective	3	Social Sciences Elective	3
		Natural Science or Engineering Elective	3
	13		15
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ITM 100	3	ITMD 362	3
ITM 313 or 312	3	ITMD 411	3
ITMD 361	3	ITMO 356	3
Natural Science or Engineering Elective	3	ITM Elective	3
Social Sciences Elective (300+)	3	Statistics Elective (MATH 425, BUS 221, PSYC 203)	3
		Minor Elective	3
	15		18
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ITMM 471	3	ITM Elective	3
ITM Elective	3	ITM Elective	3
Minor Elective	3	IPRO Elective I	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
Free Elective	3	Minor Elective	3
Free Elective	3	Free Elective	3
	18		18
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
ITMS 448	3	ITMT 430	3
ITM Elective	3	ITM Elective	3
Minor Elective	3	IPRO Elective II	3
Humanities Elective (300+)	3	Minor Elective	3
Free Elective	3	Humanities or Social Sciences Elective	3
	15		15

Total Credit Hours: 127

Information Technology Curriculum Specializations

The ITM electives may be chosen from one or more of the following course specializations. ITM required courses may not be counted toward completion of elective requirements for specializations. With the permission of the adviser, other undergraduate or graduate courses in the same area may be substituted for courses in a specialization.

Data Management

Focuses on the design, development, and administration of traditional and Internet-based data management.

Code	Title		Credit Hours
ITMD 422	Advanced Database Mgmt		3
ITMS 428	Database Security		3
Select two courses from the following:			6
ITMO 444	Cloud Computing Technologies	3	
or any ITMD elective(s)			
Total Credit Hours			12

IT Entrepreneurship and Management

Focuses on the managerial and entrepreneurial skills needed to launch a new enterprise.

Code	Title		Credit Hours
ITMM 470	Fund of Mgmt for Tech Prof		3
ITMM 481	IT Entrepreneurship		3
ITMM 482	Business Innovation		3
Select one course from ITMM or the following:			3
any BUS electives at the 200-level or above		3	
or any INTM electives selected with adviser's approval		3	
Total Credit Hours			12

Networking and Communications

Focuses on network applications and management.

Code	Title		Credit Hours
ITMO 441	Network Admin & Operations		3
ITMO 446	Telecomm Over Data Networks		3
Select one course from the following:			3
ITMO 433	Enterprise Server Admin	3	
ITMO 453	Open Source Server Admin	3	
Select one course from ITMO, ITMT, or the following:			3
ITMD 465	Rich Internet Applications	3	
ITMS 443	Vulnerability Analys and Ctrl	3	
ITMS 478	Cyber Security Management	3	
Total Credit Hours			12

Software Development

Focuses on programming and the development of sophisticated applications.

Code	Title		Credit Hours
ITMD 415	Advanced Software Development		3
ITMD 462	Web Site App Development		3
Select two courses from the following:			6
ITMD 412	Adv Structured & Systems Prg	3	
ITMD 413	Open-Source Programming	3	
ITMD 419	Topics in Software Development	3	
ITMD 453	Enterprise Intelligent Device	3	
ITMD 454	Mass-Market Intelligent Device	3	

ITMD 455	Open-Source Intelligent Device	3	
or any ITMD elective		3	
Total Credit Hours			12

System Administration

Focuses on the administration and the management of servers.

Code	Title		Credit Hours
ITMO 441	Network Admin & Operations		3
Select two courses from the following:			6
ITMO 433	Enterprise Server Admin	3	
ITMO 450	Enterprise End-User Sys Admin	3	
ITMO 453	Open Source Server Admin	3	
Select one course from the following:			3
ITMO 417	Shell Scripting for Sys Admin	3	
ITMO 444	Cloud Computing Technologies	3	
ITMO 454	Operating Sys Virtualization	3	
ITMS 458	Operating System Security	3	
Total Credit Hours			12

Systems Security

Focuses on application, data, and network security and the management of information technology security.

Code	Title		Credit Hours
ITMS 478	Cyber Security Management		3
Select one course from the following:			3
ITMO 433	Enterprise Server Admin	3	
ITMO 441	Network Admin & Operations	3	
ITMO 450	Enterprise End-User Sys Admin	3	
ITMO 453	Open Source Server Admin	3	
Select two ITMS electives			6
Total Credit Hours			12

Web Design and Application Development

Focuses on the design and development of fully-interactive websites and applications for Internet deployment.

Code	Title		Credit Hours
ITMO 441	Network Admin & Operations		3
ITMD 462	Web Site App Development		3
Select two courses from the following;			6
ITMO 444	Cloud Computing Technologies	3	
ITMD 453	Enterprise Intelligent Device	3	
ITMD 454	Mass-Market Intelligent Device	3	
ITMD 455	Open-Source Intelligent Device	3	
ITMD 463	Intermediate Web App Develop	3	
ITMD 464	Adv Web Appl Devlpmnt	3	
ITMD 465	Rich Internet Applications	3	
ITMD 466	Service-Oriented Architectures	3	
ITMD 467	Web Systems Integration	3	
ITMD 469	Topics in Application Develop	3	
Total Credit Hours			12

Bachelor of Information Technology and Management: Transfer Program

Transfer Admission Requirements

Admitted transfer students are expected to have satisfied the following Illinois Institute of Technology Core Curriculum requirements prior to admission. If not, the student must complete them while working on the ITM degree. The degree requires a minimum of 127 credit hours including transfer and coursework completed at Illinois Tech. A maximum of 68 applicable credit hours of transfer credit is permitted from a two-year college.

Basic Writing Proficiency Requirement

Students must take the Illinois Tech English Proficiency Examination before beginning classes at the university. Within their first year at the university, students who do not pass the Illinois Tech English Proficiency Examination must demonstrate basic writing proficiency by passing a composition course at Illinois Tech.

Computer Science

Two credit hours of computer programming; may be satisfied by taking ITM 311.

Humanities and Social Sciences

Nine credit hours. Humanities include literature, philosophy (except logic), and history. Social or behavioral sciences typically include anthropology, geography, political science, psychology, sociology, and economics. Studies must include a minimum of three credit hours in humanities and three credit hours in the social sciences.

Free or Technical Electives

28 credit hours of approved courses. Students should contact the Office of Undergraduate Academic Affairs for additional information.

Mathematics

Five to six credit hours: one course in discrete mathematics, and one course in statistics.

Natural Science or Engineering

10-11 credit hours of natural science or engineering courses. Relevant science courses include physics, chemistry, astronomy, biology, or engineering graphics. Two sequential courses must be from the same field and one must be from another field. In some cases, certain technology courses might be applied to this requirement. See Illinois Tech Core Curriculum section (p. 24).

Program Requirements

Transfer students are expected to take 75 credit hours at Illinois Institute of Technology and transfer 52 credit hours to complete the bachelor's degree for a total of 127 credit hours. This includes 19 information technology courses for a total of 57 credit hours in the major. An additional 18 credit hours outside the major must be taken at Illinois Institute of Technology in order to satisfy the remaining Core Curriculum requirements. These include four 300/400-level humanities and social or behavioral science electives and two IPRO courses. Two social or behavioral science electives must be from the same field and one must be from a different field; lower level social or behavioral science electives count towards this requirement. The computer science general education requirement may be satisfied by completion of ITM 311. Students who wish to complete their undergraduate studies in less than five semesters of full-time study at Illinois Institute of Technology are strongly urged to include at least nine credit hours of courses transferable as required or elective ITM courses among their free or technical electives.

All students must complete a minimum of 36 credit hours of courses with a significant written and oral communication component, identified with a (C) in the bulletin; 12 credit hours of (C)-coded courses must be taken in the major.

ITM students are required to complete a minor and are strongly encouraged to consider minors which complement their primary program of study; these include (but are not limited to) business, industrial technology, professional and technical communications, circuits and systems, computer architecture, and ROTC. Courses taken to fulfill a minor requirement may not also be used as electives in the major. The minor requirement may be waived for students entering as transfer students or who change their major to information technology and management after completion of 30 credit hours of studies at the university.

A maximum of nine credit hours of ITM graduate courses taken as an undergraduate may be applied to the Master of Information Technology and Management degree, and any graduate courses taken to fulfill undergraduate degree requirements may not also be applied to a graduate degree unless the student is enrolled in a co-terminal or accelerated master's degree program.

Required Courses

Code	Title	Credit Hours
Courses Transferred		**(52)**
(or taken at Illinois Tech)		52
Humanities Electives		**(6)**
300/400-level courses		6
Social Sciences Electives		**(6)**
300/400 level courses		6
PSYC 301 is recommended		
Interprofessional Projects		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
ITM Requirements		**(39)**
ITM 100	Intro to IT as a Profession	3
ITM 301	Intro OS and Hardware I	3
ITM 311	Intro to Software Development	3
ITM 313	Intro to Open Source App Dev	3
or ITM 312	Intro Systems Sftwr Prgmng	
ITMD 321	Data Modeling and Applications	3
ITMD 361	Fund of Web Development	3
ITMD 362	Human-Computer Interaction	3
ITMD 411	Intermediate Software Devlpmnt	3
ITMM 471	Project Management for ITM	3
ITMO 340	Intro Data Networks & Internet	3
ITMO 356	Intro Open Source OS	3
ITMS 448	Cyber Security Technologies	3
ITMT 430	System Integration	3
ITM Electives		**(18)**
Select 18 credit hours from ITM, ITMD, ITMM, ITMO, ITMS, ITMT, and TECH		18
Total Credit Hours		127

Bachelor of Information Technology and Management: Transfer Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
ITM 301	3	ITM 313 or 312	3
ITM 311	3	ITMD 362	3
ITMD 361	3	ITMM 471	3
ITMO 356	3	ITMO 340	3
Humanities Elective (300+)	3	ITM Elective	3
	15		15

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
ITM 100	3	ITMT 430	3
ITMD 321	3	ITM Elective	3
ITMD 411	3	ITM Elective	3
ITMS 448	3	ITM Elective	3
Social Sciences Elective (300+)	3	IPRO Elective I	3
	15		15

Year 3

Semester 1	Credit Hours
Social Sciences Elective (300+)	3
Humanities Elective (300+)	3
IPRO Elective II	3
ITM Elective	3
ITM Elective	3
	15

Total Credit Hours: 75

Information Technology Curriculum Specializations

The ITM electives may be chosen from one or more of the following course specializations. ITM required courses may not be counted toward completion of elective requirements for specializations. With the permission of the adviser, other undergraduate or graduate courses in the same area may be substituted for courses in a specialization.

Data Management

Focuses on the design, development, and administration of traditional and Internet-based data management.

Code	Title		Credit Hours
ITMD 422	Advanced Database Mgmt		3
ITMS 428	Database Security		3
Select two courses from the following:			6
ITMO 444	Cloud Computing Technologies	3	
or any ITMD elective(s)			
Total Credit Hours			12

IT Entrepreneurship and Management

Focuses on the managerial and entrepreneurial skills needed to launch a new enterprise.

Code	Title	Credit Hours
ITMM 470	Fund of Mgmt for Tech Prof	3
ITMM 481	IT Entrepreneurship	3

ITMM 482	Business Innovation		3
Select one course from ITMM or the following:			3
any BUS electives at the 200-level or above		3	
or any INTM electives selected with adviser's approval		3	
Total Credit Hours			12

Networking and Communications

Focuses on network applications and management.

Code	Title		Credit Hours
ITMO 441	Network Admin & Operations		3
ITMO 446	Telecomm Over Data Networks		3
Select one course from the following:			3
ITMO 433	Enterprise Server Admin	3	
ITMO 453	Open Source Server Admin	3	
Select one course from ITMO, ITMT, or the following:			3
ITMD 465	Rich Internet Applications	3	
ITMS 443	Vulnerability Analys and Ctrl	3	
ITMS 478	Cyber Security Management	3	
Total Credit Hours			12

Software Development

Focuses on programming and the development of sophisticated applications.

Code	Title		Credit Hours
ITMD 415	Adv Software Development		3
ITMD 462	Web Site App Development		3
Select two courses from the following:			6
ITMD 412	Adv Structured & Systems Prg	3	
ITMD 413	Open-Source Programming	3	
ITMD 419	Topics in Software Development	3	
ITMD 453	Enterprise Intelligent Device	3	
ITMD 454	Mass-Market Intelligent Device	3	
ITMD 455	Open-Source Intelligent Device	3	
or any ITMD elective		3	
Total Credit Hours			12

System Administration

Focuses on the administration and the management of servers.

Code	Title		Credit Hours
ITMO 441	Network Admin & Operations		3
Select two courses from the following:			6
ITMO 433	Enterprise Server Admin	3	
ITMO 450	Enterprise End-User Sys Admin	3	
ITMO 453	Open Source Server Admin	3	
Select one course from the following:			3
ITMO 417	Shell Scripting for Sys Admin	3	
ITMO 444	Cloud Computing Technologies	3	
ITMO 454	Operating Sys Virtualization	3	
ITMS 458	Operating System Security	3	
Total Credit Hours			12

Systems Security

Focuses on application, data, and network security and the management of information technology security.

Code	Title		Credit Hours
ITMS 478	Cyber Security Management		3
Select one course from the following:			3
ITMO 433	Enterprise Server Admin	3	
ITMO 441	Network Admin & Operations	3	
ITMO 450	Enterprise End-User Sys Admin	3	
ITMO 453	Open Source Server Admin	3	
Select two ITMS electives			6
Total Credit Hours			12

Web Design and Application Development

Focuses on the design and development of fully-interactive websites and applications for Internet deployment.

Code	Title		Credit Hours
ITMO 441	Network Admin & Operations		3
ITMD 462	Web Site App Development		3
Select two courses from the following;			6
ITMO 444	Cloud Computing Technologies	3	
ITMD 453	Enterprise Intelligent Device	3	
ITMD 454	Mass-Market Intelligent Device	3	
ITMD 455	Open-Source Intelligent Device	3	
ITMD 463	Intermediate Web App Develop	3	
ITMD 464	Adv Web Appl Devlpmnt	3	
ITMD 465	Rich Internet Applications	3	
ITMD 466	Service-Oriented Architectures	3	
ITMD 467	Web Systems Integration	3	
ITMD 469	Topics in Application Develop	3	
Total Credit Hours			12

Bachelor of Science in Applied Cybersecurity and Information Technology

Required Courses

Code	Title	Credit Hours
Information Technology Core Requirements		**(33)**
ITM 100	Intro to IT as a Profession	3
ITM 301	Intro OS and Hardware I	3
ITM 311	Intro to Software Development	3
ITM 313	Intro to Open Source App Dev	3
or ITM 312	Intro Systems Sftwr Prgmng	
ITMD 361	Fund of Web Development	3
ITMD 362	Human-Computer Interaction	3
ITMD 411	Intermediate Software Devlpmnt	3
ITMD 421		3
ITMM 471	Project Management for ITM	3
ITMO 440		3
ITMO 456		3
Cybersecurity Core Requirements		**(27)**
ITMM 485	Legal and Ethical Issues in IT	3
ITMS 418	Coding Security	3
ITMS 438	Cyber Forensics	3
ITMS 443	Vulnerability Analys and Ctrl	3
ITMS 448	Cyber Security Technologies	3
ITMS 458	Operating System Security	3
ITMS 478	Cyber Security Management	3
ITMS 483	Digital Evidence	3
ITMT 430	System Integration	3
Cybersecurity and Information Technology Electives		**(6)**
Select six credit hours from ITM, ITMD, ITMM, ITMO, ITMS, ITMT, or TECH courses		6
Mathematics Requirements		**(20)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 230	Introduction to Discrete Math	3
MATH 251	Multivariate & Vector Calculus	4
MATH 474	Probability and Statistics	3
Natural Science and Engineering Requirements		**(10)**
EG 225 and PHYS 200 are recommended		
See Illinois Tech Core Curriculum, section D (p. 25)		10
Humanities and Social Sciences Requirements		**(21)**
PSYC 301 is recommended		
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(6)**
Select six credit hours		6
Total Credit Hours		129

Bachelor of Science in Applied Cybersecurity and Information Technology

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
ITM 301	3	ITM 311	3
ITMD 421	3	ITMO 440	3
MATH 151	5	MATH 152	5
Humanities 200-level Elective	3	Social Sciences Elective	3
		Natural Science or Engineering Elective	3
	14		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
ITM 100	3	ITMD 362	3
ITM 313 or 312	3	ITMD 411	3
ITMD 361	3	ITMO 456	3
MATH 251	4	ITMS 478	3
Natural Science or Engineering Elective	4	MATH 230	3
		Natural Science or Engineering Elective	3
	17		18

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
ITMM 471	3	ITMS 438	3
ITMS 418	3	ITMS 443	3
ITMS 448	3	ITMS 458	3
Humanities Elective (300+)	3	MATH 474	3
Social Sciences Elective (300+)	3	IPRO Elective I	3
Free Elective	3		
	18		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
ITMM 485	3	ITMT 430	3
ITMS 483	3	Cybersecurity Elective	3
Cybersecurity Elective	3	IPRO Elective II	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
Free Elective	3	Humanities or Social Sciences Elective	3
	15		15

Total Credit Hours: 129

Minor in Cyber Security Foundations

Required Courses

This minor prepares students to enter the Master of Cyber Forensics and Security graduate degree.

Code	Title	Credit Hours
ITM 301	Intro OS and Hardware I	3
ITM 311	Intro to Software Development	3
ITMD 321	Data Modeling and Applications	3
ITMD 411	Intermediate Software Devlpmnt	3
ITMO 340	Intro Data Networks & Internet	3
Total Credit Hours		15

Minor in Information Security

Required Courses

Code	Title	Credit Hours
ITMD 321	Data Modeling and Applications	3
ITMO 340	Intro Data Networks & Internet	3
ITMS 428	Database Security	3
ITMS 448	Cyber Security Technologies	3
ITMS 478	Cyber Security Management	3
Total Credit Hours		15

Minor in Information System Administration

Required Courses

Code	Title		Credit Hours
ITM 301	Intro OS and Hardware I		3
ITMO 340	Intro Data Networks & Internet		3
ITMO 356	Intro Open Source OS		3
Select two courses from the following:			6
ITMO 417	Shell Scripting for Sys Admin	3	
ITMO 433	Enterprise Server Admin	3	
ITMO 444	Cloud Computing Technologies	3	
ITMO 450	Enterprise End-User Sys Admin	3	
ITMO 453	Open Source Server Admin	3	
ITMO 454	Operating Sys Virtualization	3	
ITMS 458	Operating System Security	3	
Total Credit Hours			15

Minor in Information System Network Management

Required Courses

Code	Title		Credit Hours
ITMM 471	Project Management for ITM		3
ITMO 340	Intro Data Networks & Internet		3
ITMO 441	Network Admin & Operations		3
ITMS 448	Cyber Security Technologies		3
Select one course from the following:			3
ITMD 361	Fund of Web Development	3	
ITMO 356	Intro Open Source OS	3	
ITMO 444	Cloud Computing Technologies	3	
Total Credit Hours			15

Minor in Information Technology and Management

Required Courses

Code	Title		Credit Hours
ITM 301	Intro OS and Hardware I		3
ITMM 471	Project Management for ITM		3
Select three courses from the following:			9
ITMD 321	Data Modeling and Applications	3	
ITMD 361	Fund of Web Development	3	
ITMD 411	Intermediate Software Devlpmnt	3	
ITMO 340	Intro Data Networks & Internet	3	
ITMO 356	Intro Open Source OS	3	
Total Credit Hours			15

Minor in Information Technology Foundations

Required Courses

This minor prepares students to enter the Master of Information Technology and Management graduate degree.

Code	Title	Credit Hours
ITM 301	Intro OS and Hardware I	3
ITM 311	Intro to Software Development	3
ITMD 321	Data Modeling and Applications	3
ITMD 361	Fund of Web Development	3
Select any 400-level ITM elective		3
Total Credit Hours		15

Minor in Internet Application Development

Required Courses

Code	Title		Credit Hours
ITM 311	Intro to Software Development		3
ITMD 361	Fund of Web Development		3
ITMD 411	Intermediate Software Devlpmnt		3
ITMD 462	Web Site App Development		3
Select one course from the following:			3
ITMD 415	Advanced Software Development	3	
ITMD 463	Intermediate Web App Develop	3	
ITMD 465	Rich Internet Applications	3	
ITMD 466	Service-Oriented Architectures	3	
ITMD 469	Topics in Application Develop	1-3	
TECH 465	Intro to Social Commerce	3	
Total Credit Hours			15

Minor in System Administration

Required Courses

Code	Title		Credit Hours
ITMO 441	Network Admin & Operations		3
Select a minimum of four courses from the following:			12
ITMO 417	Shell Scripting for Sys Admin	3	
ITMO 433	Enterprise Server Admin	3	
ITMO 444	Cloud Computing Technologies	3	
ITMO 450	Enterprise End-User Sys Admin	3	
ITMO 453	Open Source Server Admin	3	
ITMO 454	Operating Sys Virtualization	3	
ITMS 458	Operating System Security	3	
Total Credit Hours			15

Institute of Design

Denis Weil
Dean
3137 S. Federal St.
Chicago, IL 60616
312.595.4900
id.iit.edu

Since its founding as the New Bauhaus in 1937, the Institute of Design has grown into the largest full-time graduate-only design program in the U.S. with students from around the world. The school offers a professional Master of Design degree program with areas of study in communication design, interaction design, product design, strategic design, systems thinking, and user research; a dual Master of Design/M.B.A. degree program in partnership with the Stuart School of Business; the Master of Design Methods, a nine-month program for mid-career professionals; and a Ph.D. in Design. The Institute of Design created the country's first Ph.D. design program in 1991.

Minor in Human-Centered Design

Required courses (choose a minimum of 6 credits)

ID 410 Introduction to Design Processes (3crs)
ID 420 Fundamentals of Design (3crs)

Code	Title	Credit Hours
IPRO 497	Interprofessional Project	3

Domain-specific electives (choose a minimum of 6 credits**)

Code	Title	Credit Hours
BME 419	Intro Design Concepts in BME	2
BME 420	Design Concepts in BME	3
HUM 371	Fundamentals of Game Design	3
HUM 372	Interactive Storytelling	3
ITMD 361	Fund of Web Development	3
ITMD 362	Human-Computer Interaction	3
MMAE 232	Design for Innovation	3
MMAE 445	Computer-Aided Design	3

**Courses in colleges outside of the Institute of Design (ID) may have additional prerequisites or limitations on enrollment. Some 4th-year students may be able to enroll in 500 level courses at ID on a case by case basis as assessed by ID faculty.

Lewis College of Science and Letters

Christine L. Himes
Interim Dean
Robert A. Pritzker Science Center, Room 252
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Chicago, IL 60616
312.567.3956
iit.edu/science-letters

The Lewis College of Science and Letters traces its roots to the Lewis Institute, founded in 1895, and to Armour Institute of Technology, founded in 1892. Our undergraduate and graduate programs are designed to emphasize the free spirit and broad perspectives traditionally reserved for the liberal arts, while fostering the development of valuable skills such as scientific thinking, research, data analysis, and communications. The college offers rigorous and relevant programs in the sciences and humanities at the undergraduate and graduate level (including master's, professional master's, and Ph.D.) through seven departments: biology; chemistry; food science and nutrition; humanities; physics; psychology; and social sciences.

Social Sciences (p. 294)

Minors

Biology

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Chicago, IL 60616
312.567.3480
kersh@iit.edu
iit.edu/biology

Interim Chair
Jialing Xiang

Associate Chair
Tanya Bekyarova

Faculty with Research Interests
For information regarding faculty visit the Department of Biology website.

The biology program at Illinois Institute of Technology provides a rigorous educational experience in the fundamental areas of biology including genetics, microbiology, cell biology and biochemistry, and structural biophysics. It gives students a firm foundation in the field, both in biological theory and experimentation, so that students may pursue many career paths after leaving the university.

Our students also benefit from small class sizes, classes taught by faculty (not teaching assistants) who are accessible to students, and individual advising by members of the faculty.

The curriculum is interdisciplinary and flexible, allowing degree options in biology, biochemistry, bioinformatics, and molecular biochemistry and biophysics. The university offers special degree programs in dual B.S./M.S., dual B.S./D.O., and dual B.S./optometry.

Details of the traditional programs, as well as the specialized degree programs, can be found on the following pages and in the Special Programs section (p. 27).

Degree Programs

- Bachelor of Science in Biochemistry (p. 180)
- Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science (dual degree) (p. 194)
- Bachelor of Science in Bioinformatics (p. 188)
- Bachelor of Science in Biology (p. 191)
- Bachelor of Science in Biology/Bachelor of Science in Psychological Science (dual degree) (p. 194)
- Bachelor of Science in Molecular Biochemistry and Biophysics (p. 197)

Other Degree Programs in Biology

Beyond the traditional degree programs, the department offers several specialized programs designed for students who are interested in studying science and who wish to pursue a postgraduate education. Detailed programs of study for each of the programs listed below are available from the department.

Research Honors Program

This program is specifically designed for students who plan to pursue an advanced research degree. The program of study is based on the traditional degrees but is accelerated to include a full year of research experience in a faculty research lab, culminating in a senior thesis. In addition, students selected for this program may have guaranteed stipends for the summers after their sophomore and junior years in addition to any other scholarships that have been awarded.

Honors Law Program

Students in any of the biology programs are eligible for this program (p. 29). For students in biology, this is a seven-year program which can be accelerated under special conditions approved by the student's adviser.

Five-Year Financial Markets Program

This program combines an undergraduate science degree with the Master of Science in Financial Markets. The five-year combined B.S./M.S. program guarantees admission to the master's program, provided the student maintains an undergraduate GPA of 3.00 and obtains a satisfactory score on the GMAT. Students enrolled in any of the biology programs are eligible for this program.

Co-Terminal Options

The Department of Biology also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Biochemistry/Master of Biology with Biochemistry specialization
- Bachelor of Science in Biochemistry/Master of Science in Biology with Biochemistry specialization
- Bachelor of Science in Biochemistry/Master of Science in Biology for the Health Professions
- Bachelor of Science in Biochemistry/Master of Food Safety and Technology
- Bachelor of Science in Biology/Master of Biology
- Bachelor of Science in Biology/Master of Science in Biology
- Bachelor of Science in Biology/Master of Science in Biology for the Health Professions
- Bachelor of Science in Biology/Master of Computer Science
- Bachelor of Science in Biology/Master of Science in Computer Science
- Bachelor of Science in Biology/Master of Food Safety and Technology
- Bachelor of Science in Molecular Biochemistry and Biophysics/Master of Science in Molecular Biochemistry and Biophysics

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Biology website (science.iit.edu/biology).

Medical Programs

- Preparatory Program for Medical Studies (Post-Baccalaureate Premed) (p. 200)

Minors

- Minor in Biochemistry (p. 202)
- Minor in Bioinformatics (p. 202)
- Minor in Biology (p. 202)
- Minor in Pre-Medical Studies (p. 203)

Bachelor of Science in Biochemistry

The degree program in biochemistry is intended to prepare students for entrance into post-baccalaureate programs in the health professions or the basic sciences. Biochemistry is becoming an increasingly popular career path for many scientists as the basic scientific fields of chemistry and biology intertwine. The program in biochemistry will offer students a strong foundation in both the biological and chemical sciences.

Required Courses

Code	Title		Credit Hours
Biology Requirements			**(34-35)**
BIOL 100	Intro to Profession		2
BIOL 107	General Biol Lecture		3
BIOL 109	General Biology Lab		1
BIOL 115	Human Biology		3
BIOL 117	Human Biology Lab		1
BIOL 210	Microbiology		3
BIOL 214	Genetics		3
BIOL 401	Introductory Biochemistry		3
BIOL 402	Metabolic Biochemistry		3
BIOL 404	Biochemistry Laboratory		3
BIOL 445	Cell Biology		3
Select one course from the following:			3
BIOL 431	Animal Physiology Laboratory	3	
BIOL 446	Cell Biology Laboratory	3	
BIOL 455	Macromolecular Techniques	3	
BIOL 451	Biological Literature		2-3
or CHEM 451	Undergraduate Seminar		
BIOL 495	Biology Colloquium		1
Chemistry Requirements			**(27-28)**
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
CHEM 247	Analytical Chemistry		3
CHEM 343	Physical Chemistry I		3
CHEM 344	Physical Chemistry II		3-4
or CHEM 438	Physical Biochemistry		
CHEM 485	Chemistry Colloquium		1
Biochemistry Technical Electives			**(11)**
Select 11 credit hours from the following courses:			11
BIOL 225	Microbiology Laboratory	2	
FDSN 401	Nutrition, Metabolism & Health	3	
MATH 252	Introduction to Diff Equations	4	
PHYS 410	Molecular Biophysics	3	
Any 300+ level BIOL or CHEM course		3	
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
Mathematics Requirements			**(17)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4

MATH 425	Statistical Methods	3
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
or CS 115	Object-Oriented Programming I	
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Total Credit Hours		126-128

Bachelor of Science in Biochemistry Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
BIOL 109	1	CHEM 125	4
CHEM 124	4	MATH 152	5
MATH 151	5	Humanities 200-level Course	3
	15		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 214	3	BIOL 210	3
CHEM 237	4	CHEM 239	3
PHYS 123	4	CHEM 240	2
MATH 251	4	PHYS 221	4
CS 105, 110, or 115	2	Social Sciences Elective	3
	17		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
Biology Laboratory Elective[1]	3	CHEM 344 or 438	3-4
BIOL 445	3	MATH 425	3
CHEM 247	3	Biochemistry Technical Elective[2]	3
CHEM 343	3	IPRO Elective I	3
CHEM 485	1	Social Sciences Elective (300+)	3
Humanities or Social Sciences Elective	3		
	16		15-16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
BIOL 404	3	BIOL 451	2
BIOL 495	1	Biochemistry Technical Elective[2]	2-3
Biochemistry Technical Elective[2]	3	Biochemistry Technical Elective[2]	3
IPRO Elective II	3	Humanities Elective (300+)	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	16		16-17

Total Credit Hours: 126-128

1. Select from the following courses: BIOL 431, BIOL 446, or BIOL 455.
2. Select from the following courses: BIOL 225, FDSN 401, MATH 252, PHYS 410, or any 300+ level BIOL or CHEM course.

Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science

Required Courses

Code	Title		Credit Hours
Biology Requirements			**(29)**
BIOL 107	General Biol Lecture		3
BIOL 109	General Biology Lab		1
BIOL 115	Human Biology		3
BIOL 117	Human Biology Lab		1
BIOL 210	Microbiology		3
BIOL 214	Genetics		3
BIOL 401	Introductory Biochemistry		3
BIOL 402	Metabolic Biochemistry		3
BIOL 404	Biochemistry Laboratory		3
BIOL 445	Cell Biology		3
BIOL 451	Biological Literature		2
BIOL 495	Biology Colloquium		1
or CHEM 485	Chemistry Colloquium		
Dual Degree Elective			**(3)**
Select three credit hours from the following:			3
BIOL 420	Population Genetics	3	
BIOL 430	Human Physiology	3	
BIOL 475	Health/Disease in Mod Society	3	
FDSN 401	Nutrition, Metabolism & Health	3	
Biochemistry Elective			**(2-3)**
Select two to three credit hours			2-3
Chemistry Requirements			**(26)**
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
CHEM 247	Analytical Chemistry		3
CHEM 343	Physical Chemistry I		3
CHEM 438	Physical Biochemistry		3
or CHEM 344	Physical Chemistry II		
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
Mathematics Requirements			**(17-18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 425	Statistical Methods		3-4
or PSYC 203	Undergrad Stats Bhvrl Sci		
Psychological Science Requirements			**(28)**
PSYC 204	Rsrch Method in Behavioral Sci		4
PSYC 221	Intro to Psychological Science		3
PSYC 301	Industrial Psychology		3
or PSYC 303	Intro to Psychopathology		

PSYC 310	Social Psychology	3
PSYC 312	Human Motivation and Emotion	3
or PSYC 423	Learning Theory	
or PSYC 426	Cognitive Science	
PSYC 320	Applied Correlation/Regression	3
or PSYC 409	Psychological Testing	
PSYC 414	Neural & Biol Bases Behavior	3
PSYC 435	Child Development	3
or PSYC 436	Adult Development	
PSYC 485	Senior Capstone Project I	3
Psychological Science Electives		**(9)**
Select nine credit hours [1]		9
Introduction to the Profession		**(2-3)**
BIOL 100	Intro to Profession	2-3
or PSYC 100	Intro to Profession	
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Sciences Requirements		**(12-21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24) [1]		12-21

Minimum degree credits required: 144

1 B.S. Biochemistry/B.S. Psychological Science students may apply a maximum of three psychology courses to both the social sciences requirements and the psychology electives specified for the psychological science degree requirements (psychology electives must be 300-level and above). At least one of the social science "S" courses must be a non-psychology course.

Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science Curriculum - Eight Semester Plan

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
BIOL 109	1	CHEM 125	4
CHEM 124	4	PHYS 123	4
MATH 151	5	PSYC 301	3
PSYC 221	3	Humanities 200-level Course	3
	18		18

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 214	3	BIOL 210	3
CHEM 237	4	MATH 251	4
MATH 152	5	PHYS 221	4
PSYC 310	3	PSYC 204	4
Humanities Elective (300+)	3	Social Sciences Elective[1]	3
	18		18

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 445	3	CHEM 239	3
CHEM 247	3	CHEM 240	2
PSYC 320	3	CS 105	2
PSYC 414	3	MATH 425	3
IPRO Elective I	3	PSYC 435	3
Social Sciences Elective (300+)[1]	3	Biochemistry Elective	2
		IPRO Elective II	3
	18		18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
BIOL 404	3	BIOL 451	2
CHEM 343	3	BIOL 495	1
PSYC 426	3	CHEM 438	3
Humanities Elective (300+)	3	PSYC 485	3
Social Sciences Elective (300+)[1]	3	Dual Degree Elective[2]	3
		Humanities or Social Sciences Elective[1]	3
	18		18

Total Credit Hours: 144

1 B.S. Biochemistry/B.S. Psychological Science students may apply a maximum of three psychology courses to both the social sciences requirements and the psychology electives specified for the psychological science degree requirements (psychology electives must be 300-level and above). At least one of the social science "S" courses must be a non-psychology course.

2 Select one course from the following: BIOL 420, BIOL 430, BIOL 475, or FDSN 401.

Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science Curriculum - Nine Semester Plan

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
CHEM 124	4	CHEM 125	4
MATH 151	5	PHYS 123	4
PSYC 221	3	PSYC 303	3
	17		15

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 109	1	BIOL 210	3
BIOL 214	3	PHYS 221	4
MATH 152	5	PSYC 204	4
PSYC 203	4	Humanities/Social Sciences Elective[1]	3
Humanities 200-level Course	3		
	16		14

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CHEM 237	4	CHEM 239	3
MATH 251	4	CHEM 240	2
PSYC 320	3	PSYC 310	3
PSYC 414	3	PSYC 435	3
IPRO Elective I	3	Biochemistry Elective	2
		Dual Degree Elective[2]	3
	17		16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
CHEM 247	3	BIOL 451	2
CHEM 343	3	CHEM 438	3
CS 105	2	Social Sciences Elective (300+)[1]	3
PSYC 426	3	Humanities Elective (300+)	3
Social Sciences Elective[1]	3	IPRO Elective II	3
	17		17

Year 5

Semester 1	Credit Hours
BIOL 404	3
BIOL 445	3
BIOL 495	1
PSYC 485	3
Humanities Elective (300+)	3

Social Sciences Elective (300+)[1]	3
	16

Total Credit Hours: 145

1 B.S. Biochemistry/B.S. Psychological Science students may apply a maximum of three psychology courses to both the social sciences requirements and the psychology electives specified for the psychological science degree requirements (psychology electives must be 300-level and above). At least one of the social science "S" courses must be a non-psychology course.

2 Select one course from the following: BIOL 420, BIOL 430, BIOL 475, or FDSN 401.

Bachelor of Science in Bioinformatics

At Illinois Tech the bioinformatics major blends courses in biology, chemistry, and physics with courses in programming, statistics, and other methods, producing graduates who are both strong in science and able to develop and use data processing tools to advance scientific knowledge.

Our program is scientifically rigorous, providing students with in-demand programming and analytical skills through a solid, balanced offering in STEM courses. Combined with undergraduate research opportunities, this rounded curriculum provides the knowledge, skills, and experiences to pursue careers in bioinformatics or computational biology.

Courses include programming in Perl, C++, and Java; data structure and algorithms; data mining; statistics; human biology; genetics; genomics and transcriptomics; and more.

Two tracks are available. Applied Bioinformatics has more required and elective courses in computer science. Computational Biology has more required and elective courses in biology.

Required Courses

Code	Title		Credit Hours
Biology Requirements			**(29)**
BIOL 100	Intro to Profession		2
BIOL 104	Linux and Perl Programming		3
BIOL 107	General Biol Lecture		3
BIOL 115	Human Biology		3
BIOL 210	Microbiology		3
BIOL 214	Genetics		3
BIOL 225	Microbiology Laboratory		2
BIOL 403	Biochemistry		4
BIOL 413	Genomics and Transcriptomics		3
BIOL 451	Biological Literature		2
BIOL 495	Biology Colloquium		1
Chemistry Requirements			**(12)**
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
Physics Requirements			**(11)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 224	Gen Physics III for Engnrs		3
Track Electives			**(9-10)**
Select a track in Applied Bioinformatics or Computational Biology			9-10
Option 1: Applied Bioinformatics		9	
MATH 332	Elementary Linear Algebra	3	
CS 422	Data Mining	3	
CS 425	Database Organization	3	
Option 2: Computational Biology		10	
MATH 252	Introduction to Diff Equations	4	
BIOL 445	Cell Biology	3	
BIOL 446	Cell Biology Laboratory	3	
Bioinformatics Technical Electives			**(9)**
Select a minimum of nine credit hours of technical electives, with at least two electives in the chosen Bioinformatics track (Applied Bioinformatics or Computational Biology)			9
Applied Bioinformatics Technical Electives			
CS 429	Information Retrieval	3	
CS 430	Introduction to Algorithms	3	
CS 445	Objct Orntd Dsgn Prgmng	3	

CS 450	Operating Systems	3	
CS 451	Parallel/Distributed Computing	3	
CS 491	Undergraduate Research [1]	1-6	
CS 595	Topics in Computer Science [1]	3-12	
Computational Biology Technical Electives			
BIOL 305	Human Anatomy	3	
BIOL 404	Biochemistry Laboratory	3	
BIOL 410	Medical Microbiology	3	
BIOL 426	Concepts of Cancer Biology	3	
BIOL 430	Human Physiology	3	
BIOL 491	Biology Research Project [1]	1-3	
Suggested Additional Electives			
CHEM 239	Organic Chemistry II	3	
CHEM 343	Physical Chemistry I	3	
MATH 350	Intro to Computational Mathe [1]	3	
PHYS 240	Computational Science	3	
PHYS 410	Molecular Biophysics	3	
Mathematics Requirements			**(20)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 475	Probability		3
MATH 476	Statistics		3
Computer Science Requirements			**(10)**
Select one of the following options:			4
Option 1:			
CS 115 & CS 116	Object-Oriented Programming I and Object-Oriented Programming II	4	
Option 2:			
CS 201	Accelerated Intro to Cmptr Sci	4	
CS 330	Discrete Structures		3
CS 331	Data Structures and Algorithms		3
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Humanities and Social Science Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Total Credit Hours			127-128

[1] Adviser and/or instructor approval required.

Bachelor of Science in Bioinformatics Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 100	2	BIOL 104	3
BIOL 107	3	BIOL 115	3
CHEM 124	4	CHEM 125	4
CS 115	2	CS 116	2
MATH 151	5	MATH 152	5
	16		17
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 214	3	BIOL 210	3
PHYS 123	4	BIOL 225	2
CS 330	3	PHYS 221	4
MATH 251	4	Track Elective[1]	3-4
Social Sciences Elective	3	Humanities 200-level Course	3
	17		15-16
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 237	4	BIOL 403	4
MATH 475	3	BIOL 413	3
Bioinformatics Technical Elective	3	CS 331	3
Humanities or Social Sciences Elective	3	PHYS 224	3
Humanities Elective (300+)	3	Bioinformatics Technical Elective	3
	16		16
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
MATH 476	3	BIOL 451	2
Track Elective[2]	3	BIOL 495	1
Track Elective[2]	3	Bioinformatics Technical Elective	3
IPRO Elective I	3	Humanities Elective (300+)	3
Social Sciences Elective (300+)	3	Social Sciences Elective (300+)	3
		IPRO Elective II	3
	15		15

Total Credit Hours: 127-128

1 For the Applied Bioinformatics track, select MATH 332. For the Computational Biology track, select MATH 252.

2 For the Applied Bioinformatics track, select CS 422 and CS 425. For the Computational Biology track, select BIOL 445 and BIOL 445.

Bachelor of Science in Biology

The undergraduate biology degree at Illinois Institute of Technology provides excellent preparation for the health professions, including medicine, osteopathic medicine, and dentistry. In addition, the rigorous program prepares graduates for careers in biotechnology, biochemistry, patent law, and environmental science. Graduates are also prepared for immediate entry into positions in industrial, medical, and other research laboratories and for graduate programs in biotechnology, cell biology, biochemistry, genetics, and molecular biology.

The objectives of the university's biology major are to give students strong training in the areas of modern cell biology, genetics, biochemistry, microbiology, and physiology, supported by a solid foundation in mathematics and the physical sciences. In addition, the biology major is designed to give students broad opportunities to study advanced topics in biology, both in the classroom and by participating in undergraduate research projects.

Required Courses

Code	Title		Credit Hours
Biology Requirements			**(34)**
BIOL 100	Intro to Profession		2
BIOL 107	General Biol Lecture		3
BIOL 109	General Biology Lab		1
BIOL 115	Human Biology		3
BIOL 117	Human Biology Lab		1
BIOL 210	Microbiology		3
BIOL 214	Genetics		3
BIOL 225	Microbiology Laboratory		2
BIOL 401	Introductory Biochemistry		3
BIOL 402	Metabolic Biochemistry		3
BIOL 430	Human Physiology		3
BIOL 445	Cell Biology		3
BIOL 451	Biological Literature		2
BIOL 495	Biology Colloquium		1
BIOL 495	Biology Colloquium		1
Senior Biology Laboratory Requirements			**(6)**
Select two courses from the following:			6
BIOL 404	Biochemistry Laboratory	3	
BIOL 431	Animal Physiology Laboratory	3	
BIOL 446	Cell Biology Laboratory	3	
BIOL 455	Macromolecular Techniques	3	
Biology Electives			**(12)**
Select 12 credit hours			12
Mathematics Requirements			**(13)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 425	Statistical Methods		3
Chemistry Requirements			**(18)**
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 247	Analytical Chemistry		3
Physics Requirements			**(11)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 224	Gen Physics III for Engnrs		3
Computer Science Requirement			**(2)**
CS 105	Intro to Computer Programming		2

or CS 110	Computing Principles	
Interprofessional Projects		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Free Elective		**(3)**
Select three credit hours		3
Total Credit Hours		126

Bachelor of Science in Biology Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
BIOL 109	1	CHEM 125	4
CHEM 124	4	MATH 152	5
MATH 151	5	Humanities 200-level Course	3
	15		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 214	3	BIOL 210	3
CHEM 237	4	BIOL 225	2
PHYS 123	4	CHEM 239	3
Social Sciences Elective	3	PHYS 221	4
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	17		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
Senior Biology Laboratory Elective[1]	3	BIOL 430	3
CHEM 247	3	IPRO Elective I	3
PHYS 224	3	CS 105 or 110	2
Social Sciences Elective (300+)	3	MATH 425	3
		Humanities Elective (300+)	3
	15		17

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 445	3	BIOL 451	2
BIOL 495	1	BIOL 495	1
Senior Biology Laboratory Elective[1]	3	IPRO Elective II	3
Biology Elective	3	Biology Elective	3
Biology Elective	3	Biology Elective	3
Free Elective	3	Social Sciences Elective (300+)	3
	16		15

Total Credit Hours: 126

1 Choose from the following courses: BIOL 404, BIOL 431, BIOL 446, or BIOL 455.

Bachelor of Science in Biology/Bachelor of Science in Psychological Science

This program provides an integrated dual degree program leading to the Bachelor of Science in Biology and the Bachelor of Science in Psychological Science while maintaining the integrity and program content of each individual degree program.

This program has two main target audiences:

1. Pre-health students (pre-MD, pre-clinical psychologist or psychiatrist) who are interested in neurological or behavioral issues. A challenging dual degree program will be an asset in the professional school application process, and this program will provide an excellent preparation for the MCAT.
2. Students interested in moving on to graduate school in studies at the interface of biology and psychology, such as neuroscience, brain science, or cognitive science.

Required Courses

Code	Title	Credit Hours
Biology Requirements		**(34)**
BIOL 107	General Biol Lecture	3
BIOL 109	General Biology Lab	1
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
BIOL 210	Microbiology	3
BIOL 214	Genetics	3
BIOL 225	Microbiology Laboratory	2
BIOL 401	Introductory Biochemistry	3
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
or BIOL 431	Animal Physiology Laboratory	
or BIOL 446	Cell Biology Laboratory	
BIOL 430	Human Physiology	3
BIOL 445	Cell Biology	3
BIOL 451	Biological Literature	2
BIOL 495	Biology Colloquium	1
Biology Electives		**(6)**
Select six credit hours		6
Chemistry Requirements		**(18)**
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 247	Analytical Chemistry	3
Physics Requirements		**(11)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
PHYS 224	Gen Physics III for Engnrs	3
Mathematics Requirements		**(13-14)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 425	Statistical Methods	3-4
or PSYC 203	Undergrad Stats Bhvrl Sci	
Psychological Science Requirements		**(28)**
PSYC 204	Rsrch Method in Behavioral Sci	4
PSYC 221	Intro to Psychological Science	3

PSYC 301	Industrial Psychology	3
or PSYC 303	Intro to Psychopathology	
PSYC 310	Social Psychology	3
PSYC 320	Applied Correlation/Regression	3
or PSYC 409	Psychological Testing	
PSYC 414	Neural & Biol Bases Behavior	3
PSYC 426	Cognitive Science	3
PSYC 435	Child Development	3
or PSYC 436	Adult Development	
PSYC 485	Senior Capstone Project I	3
Psychological Science Electives		**(6)**
Select six credit hours		6
Introduction to the Profession		**(3)**
BIOL 100	Intro to Profession	3
or PSYC 100	Intro to Profession	
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Sciences Requirements		**(15)**
See Illinois Tech Core Curriculum, sections B and C (p. 24) [1]		15
Total Credit Hours		142-143

1 B.S. Biology/B.S. Psychological Science students have a reduced humanities and social sciences requirement because six credit hours of social sciences are satisfied by six credit hours of psychology "S" designated courses.

Bachelor of Science in Biology/Bachelor of Science in Psychological Science Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 100 or PSYC 100	3	BIOL 115	3
BIOL 107	3	BIOL 117	1
PSYC 221	3	PSYC 301	3
CHEM 124	4	CHEM 125	4
MATH 151	5	MATH 152	5
		CS 105 or 110	2
	18		18
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 109	1	BIOL 210	3
BIOL 214	3	BIOL 225	2
PSYC 310	3	Psychological Science Elective	3
CHEM 237	4	CHEM 239	3
PHYS 123	4	PHYS 221	4
Humanities 200-level Course	3	Humanities Elective (300+)	3
	18		18
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 445	3	BIOL 430	3
Biology Elective	3	BIOL 495	1
PSYC 414	3	PSYC 204	4
PHYS 224	3	PSYC 320 or 409	3
IPRO Elective I	3	MATH 425 or PSYC 203	3-4
Social Sciences Elective	3	IPRO Elective II	3
	18		17-18
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 401	3	BIOL 402	3
BIOL 404, 431, or 446	3	BIOL 451	2
Psychological Science Elective	3	PSYC 435 or 436	3
PSYC 426	3	PSYC 485	3
CHEM 247	3	Biology Elective	3
Humanities Elective (300+)	3	Humanities or Social Sciences Elective	3
	18		17

Total Credit Hours: 142-143

Bachelor of Science in Molecular Biochemistry and Biophysics

Why should a biologist know about physics and chemistry? Why should physicists and chemists know about biology? Just ask some of Illinois Institute of Technology's faculty who are using x-ray synchrotron radiation science to study proteins and their molecular structures. This research may lead to the important advances in understanding the causes of a number of diseases.

Molecular biochemistry and biophysics (MBB) is an interdisciplinary major, combining studies in biology, chemistry, and physics. Its objectives are to give students solid training in the areas of modern cell biology, genetics, and biochemistry while also providing a strong background in mathematics and the physical sciences. In this way the MBB degree will provide each student with the skills needed to succeed as a professional in biology as the field becomes increasingly dependent on new technologies.

Through this curriculum, students will discover the essential building blocks of life, how they fit together, how they work, and the physical methods for exploring them. With its quantitative emphasis encompassing all the sciences, this program is a great way to prepare for careers in medicine or medical research. It is also one of the majors that is part of the honors medical programs with Rush University.

Required Courses

Code	Title		Credit Hours
Biology Requirements			**(34-35)**
BIOL 100	Intro to Profession		2
BIOL 107	General Biol Lecture		3
BIOL 109	General Biology Lab		1
BIOL 115	Human Biology		3
BIOL 117	Human Biology Lab		1
BIOL 210	Microbiology		3
BIOL 214	Genetics		3
BIOL 401	Introductory Biochemistry		3
BIOL 402	Metabolic Biochemistry		3
BIOL 445	Cell Biology		3
BIOL 455	Macromolecular Techniques		3
BIOL 451	Biological Literature		2-3
or CHEM 451	Undergraduate Seminar		
BIOL 495	Biology Colloquium		1
Select three credit hours from the following courses:			3
BIOL 404	Biochemistry Laboratory	3	
BIOL 431	Animal Physiology Laboratory	3	
BIOL 446	Cell Biology Laboratory	3	
Chemistry Requirements			**(22)**
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 247	Analytical Chemistry		3
CHEM 343	Physical Chemistry I		3
CHEM 485	Chemistry Colloquium		1
Physics Requirements			**(11-12)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 223	General Physics III		3-4
or PHYS 224	Gen Physics III for Engnrs		
Molecular Biochemistry and Biophysics Electives			**(6)**
Select two courses from the following:			6
BIOL 555	Macromolecular Structure	3	
CHEM 538	Physical Biochemistry	3	
CHEM 553	Chemical Statistical Thermo	3	

PHYS 304	Thermodynmics&Statistical Phys	3	
or PHYS 410	Molecular Biophysics		
PHYS 420	Bio-Nanotechnology	3	
Technical Electives			**(6)**
Select a minimum of six credit hours from any 300-level or above Biology, Chemistry, or Physics class, or other approved class.			6
Mathematics Requirements			**(21)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
MATH 425	Statistical Methods		3
Computer Science Requirement			**(2)**
CS 104	Intro to Comp Prgrm for Engrs		2
Humanities and Social Science Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Total Credit Hours			129-131

Bachelor of Science in Molecular Biochemistry and Biophysics Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
BIOL 109	1	CHEM 125	4
CHEM 124	4	MATH 152	5
MATH 151	5	Humanities 200-level Course	3
	15		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 214	3	BIOL 210	3
CHEM 237	4	CHEM 239	3
CS 104	2	MATH 251	4
PHYS 123	4	PHYS 221	4
Humanities or Social Sciences Elective	3	Social Sciences Elective	3
	16		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
CHEM 247	3	BIOL 495	1
MATH 252	4	CHEM 343	3
PHYS 223 or 224	3-4	Technical Elective[1]	3
IPRO Elective I	3	IPRO Elective II	3
		Humanities Elective (300+)	3
	16-17		16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 445	3	BIOL 451 or CHEM 451	2-3
BIOL 455	3	Biology Laboratory Elective[3]	3
CHEM 485	1	MATH 425	3
MBB Elective[2]	3	MBB Elective[2]	3
Technical Elective[1]	3	Social Sciences Elective (300+)	3
Humanities Elective (300+)	3	Social Sciences Elective (300+)	3
	16		17-18

Total Credit Hours: 129-131

1. Choose from any BIOL, CHEM, or PHYS 300-level or above approved course.
2. Students may select from the following courses: BIOL 555; CHEM 538; CHEM 553; PHYS 410 or PHYS 304; or PHYS 420.
3. Students may select from the following courses: BIOL 404, BIOL 431, or BIOL 446.

Preparatory Program for Medical Studies (Post-Baccalaureate Premed)

The purpose of the Preparatory Program for Medical Studies is to meet the needs of college graduates who have decided to pursue a medical education but who lack some or all of the basic science courses required for admission to medical school. The objective of the program is to provide rigorous education in all areas of the premedical sciences that are required for admission to any medical, osteopathic, or veterinary school in the country.

Coursework

Students sufficiently prepared in mathematics and English who enter the program in the fall semester can expect to complete the program in two years. The third year is known as the “glide year.” This is the year between completing the program and entering medical school. For most students, the glide year provides the opportunity to take additional courses or to deepen their exposure to medicine through full-time employment in a clinical setting or in a medical research laboratory. In order to be eligible for admission to medical school and subsequently, to be licensed to practice medicine, students must complete the following seven courses in the arts and sciences:

- One year of college English, including a significant amount of expository writing
- One year of college mathematics, including statistics
- One year of general physics, including laboratory
- One year of general chemistry, including laboratory
- One year of organic chemistry, including laboratory
- One year of biology, including laboratory, with significant emphasis in molecular and cellular biology
- One year of upper level coursework in biological sciences, including biochemistry

Advising and Support

On the Mies Campus of Illinois Institute of Technology, there are a number of advisers who together constitute the Premedical Advisory Committee (science.iit.edu/pre-medicine). Preparatory program students will be assigned an adviser who will be available to counsel them as they plan their program of study and as they prepare their applications to medical school. A number of academic support services will be made available to students in the preparatory program. In the university’s Academic Resource Center, students can meet with tutors at no expense for additional help in their premedical courses. In the Premedical Office, support staff will collect and send letters of recommendation to medical schools. Each year the Premedical Office and the AMSA-IIT host a number of events specifically for premedical students including special seminars of medical interest and forums in which current students can learn from experiences of those who have already taken the MCAT or been admitted to medical school. Preparatory program students are invited and encouraged to attend weekly colloquia in the biological and chemical sciences and in other departments offering seminars of medical interest. Finally, the university's location in the city of Chicago is a special advantage to students in the preparatory program. The city is home to six medical schools and numerous hospitals and medical research centers. It is also home to the American Medical Association. This concentration of medical practice will provide preparatory program students with a wide variety of opportunities to gain experience in both clinical settings and in medical research through volunteer service and paid employment.

Academic Standards

Medical schools expect successful applicants to possess excellent grounding in the premedical sciences. The quality of a student’s preparation is measured by the grades earned in premedical courses. For this reason, preparatory program students will be held to high academic standards. At a minimum, students must maintain a cumulative GPA of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant’s character. Students in the preparatory program are expected to conduct themselves with honesty and integrity, inspiring confidence in their abilities to assume the responsibilities of medical practice. Students in the preparatory program are subject to the academic and disciplinary standards detailed in the Illinois Institute of Technology Student Handbook.

Admissions Eligibility

The student must hold the degree of bachelor of arts or science from an accredited college or university in the United States or an equivalent degree from an institution outside the United States. At a minimum, successful applicants must possess a cumulative undergraduate GPA of 3.00. In most cases, students will not be eligible for admission if they have applied to medical school previously or have completed their premedical preparation elsewhere within the last five years. This is not a remedial program. Students must submit a complete application package to the Office of Undergraduate Admission for full consideration.

Required Courses

Code	Title	Credit Hours
Chemistry Requirements		**(17)**
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Lab	2
Biology Requirements		**(18)**
BIOL 107	General Biol Lecture	3
BIOL 109	General Biology Lab	1
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
BIOL 214	Genetics	3
BIOL 403	Biochemistry	4
BIOL 445	Cell Biology	3
Mathematics Requirements		**(13)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 425	Statistical Methods	3
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Total Credit Hours		56

Preparatory Program for Medical Studies Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 107	3	BIOL 115	3
BIOL 109	1	BIOL 117	1
CHEM 124	4	CHEM 125	4
MATH 151	5	MATH 152	5
	13		13

			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 214	3	BIOL 403	4
BIOL 445	3	CHEM 239	3
CHEM 237	4	CHEM 240	2
PHYS 123	4	MATH 425	3
		PHYS 221	4
	14		16

Total Credit Hours: 56

- Prepare and take MCAT in Semester 4.
- Submit medical school applications after Semester 4.
- Additional coursework for MCAT preparation may be required based on undergraduate degree program and may be incorporated into Semesters 1-4.

Minor in Biochemistry

Required Courses

Code	Title	Credit Hours
BIOL 214	Genetics	3
BIOL 401	Introductory Biochemistry	3
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
BIOL 445	Cell Biology	3
Total Credit Hours		15

Minor in Bioinformatics

Required Courses

The Bioinformatics minor requires a minimum of 15 credit hours of courses that are listed below and that are not required courses for a specific degree program.

Code	Title		Credit Hours
Required Courses			
BIOL 104	Linux and Perl Programming		3
BIOL 105	Introduction to Biology		3
BIOL 214	Genetics		3
BIOL 413	Genomics and Transcriptomics		3
CS 201	Accelerated Intro to Cmptr Sci		4
CS 331	Data Structures and Algorithms		3
Elective Courses			
Select a minimum of six credit hours from the following:			
BIOL 114	Introduction to Human Biology	3	
BIOL 420	Population Genetics	3	
BIOL 445	Cell Biology	3	
CS 330	Discrete Structures	3	
CS 422	Data Mining	3	
CS 425	Database Organization	3	
MATH 425	Statistical Methods	3	

Minor in Biology

Required Courses

Code	Title		Credit Hours
BIOL 107	General Biol Lecture		3
BIOL 115	Human Biology		3
BIOL 214	Genetics		3
BIOL 445	Cell Biology		3
Select a minimum of one course from the following:			3
BIOL 210	Microbiology	3	
BIOL 305	Human Anatomy	3	
BIOL 327	Introduction to Immunology	3	
BIOL 401	Introductory Biochemistry	3	
BIOL 402	Metabolic Biochemistry	3	
BIOL 404	Biochemistry Laboratory	3	
BIOL 410	Medical Microbiology	3	
BIOL 426	Concepts of Cancer Biology	3	

BIOL 430	Human Physiology	3	
BIOL 446	Cell Biology Laboratory	3	
or an approved biology elective at the 500-level			
Total Credit Hours			15

Minor in Pre-Medical Studies

The minor in premedical studies is intended for those students who plan to apply to medical school and has been approved by the Premedical Advisory Committee. The minor includes courses that satisfy the prerequisite coursework of most medical schools, cover the majority of topics on the MCAT and other entrance examinations, and courses designed to increase the competitiveness of a student's application.

Students may complete courses on this list as part of their major, core curriculum, or free electives. Regardless of where each course fits into a student's curriculum, any student who completes all of these courses (or substitutes approved by the Premedical Advisory Committee) will be credited as having received this minor.

Required Courses

Code	Title		Credit Hours
BIOL 107	General Biol Lecture		3
BIOL 109	General Biology Lab		1-2
or BME 405	Physiology Laboratory		
BIOL 115	Human Biology		3
BIOL 117	Human Biology Lab		1
BIOL 214	Genetics		3
Select one of the following:			4-6
BIOL 401 & BIOL 402	Introductory Biochemistry and Metabolic Biochemistry	6	
BIOL 403	Biochemistry	4	
Select one of the following:			3
BIOL 430	Human Physiology	3	
BIOL 445	Cell Biology [1]	3	
BME 453	Quantitative Physiology	3	
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
MATH 151	Calculus I		5
MATH 152	Calculus II		5
Choose one of the following statistics courses:			3-4
BME 433	BME Applications of Statistics	3	
BUS 221	Business Statistics	3	
CHE 426	Statistical Tools Engineers	3	
MATH 374	Probability/Statistics for ECE	3	
MATH 425	Statistical Methods	3	
MATH 474	Probability and Statistics	3	
MATH 476	Statistics	3	
PSYC 203	Undergrad Stats Bhvrl Sci	4	
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
Humanities 200-level course			3
Choose one of the following ethics courses:			3
PHIL 351	Science and Values	3	
PHIL 360	Ethics	3	

PHIL 380	Topics in Philosophy (Bioethics)	3	
Choose one of the following communication courses:			3
COM 301	Intro Linguistics	3	
COM 308	Structure of Modern English	3	
COM 309	History English Language	3	
COM 371	Persuasion	3	
COM 421	Technical Communication [2]	3	
COM 428	Verbal Visual Communications [2]	3	
COM 435	Intercultural Communication [1]	3	
SOC 200	Introduction to Sociology [1]		3
or SOC 203	Engaging Sociology		
PSYC 221	Intro to Psychological Science		3
Choose one of the following psychology courses:			3
PSYC 303	Intro to Psychopathology	3	
PSYC 310	Social Psychology	3	
PSYC 330	Health Psychology	3	
PSYC 414	Neural & Biol Bases Behavior [1, 2]	3	
Choose one of the following PS or SSCI courses:			3
PS 313	Comparative Public Policy	3	
SSCI 318	Global Health	3	
SSCI 319	Comparative Health Systems	3	
SSCI 321	Social Inequality	3	
Total Credit Hours			77-81

1 Indicates the preferred course.

2 Indicates courses in which students must petition to allow them to count for the core curriculum requirements.

Chemistry

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Chair
Yuanbing Mao

Associate Chair
Katherine Leight

Faculty with Research Interests
For information regarding faculty visit the Department of Chemistry website.

The chemistry program at Illinois Institute of Technology provides rigorous education in the fundamental areas of chemical theory and chemical experimentation. It roots students in the discipline and provides them with a firm foundation so that they can take many paths from here.

Our undergraduate degree is accredited by the American Chemical Society and is excellent preparation for a career in industry or for advanced degrees. Recent graduates have begun industry careers or are now in medical school, graduate school, and pharmacy programs. Dual-degree, major-plus-minor, combined bachelor's/master's, premedical, and honors law options are also available.

Details of the traditional programs, as well as the specialized degree programs, can be found on the following pages and in the Special Programs section (p. 27).

Degree Programs

- Bachelor of Science in Bioanalytical Chemistry (p. 207)
- Bachelor of Science in Chemistry (p. 210)
- Bachelor of Science in Computational Chemistry and Biochemistry (p. 214)
- Bachelor of Science in Environmental Chemistry (p. 217)
- Bachelor of Science in Forensic Chemistry (p. 220)
- Bachelor of Science in Medicinal Chemistry (p. 223)

Co-Terminal Options

The Department of Chemistry also offers the following co-terminal degrees, which enable a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Chemistry/Master of Science in Biology for the Health Professions
- Bachelor of Science in Chemistry/Master of Chemical Engineering
- Bachelor of Science in Chemistry/Master of Food Safety and Technology
- Bachelor of Science in Chemistry/Master of Science in Environmental Management and Sustainability

Co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Chemistry website (science.iit.edu/chemistry).

Other Degree Programs in Chemistry

Beyond the traditional degree programs, the department offers several specialized programs designed for students who are interested in studying science and who wish to pursue a postgraduate education. Detailed programs of study for each of the programs listed below are available from the department.

Research Honors Program

This program is specifically designed for students who plan to pursue an advanced research degree. The program of study is based on the traditional degrees but is accelerated to include a full year of research experience in a faculty research lab, culminating in a senior thesis. In addition, students selected for this program may have guaranteed stipends for the summers after their sophomore and junior years in addition to any other scholarships that have been awarded.

Combined B.S./M.D. Program

For detailed information, see the Special Programs section (p. 31).

Honors Law Program

Students in any of the chemistry programs are eligible for this program (p. 29). For students in chemistry, this is a seven-year program which can be accelerated under special conditions approved by the student's adviser.

Minors

- Minor in Chemistry (p. 226)

Bachelor of Science in Bioanalytical Chemistry

Bioanalytical chemistry is a study of chemical and biochemical methods and instrumental techniques for analysis and detection of biomolecules and biologically active molecules including small drugs, drug metabolites, proteins, peptides, antibodies, DNAs, enzymes, and biologics. Bioanalytical chemistry is a key discipline in biomedical and pharmaceutical research and applied to a study of biological processes, detection and diagnosis of human diseases, and preclinical and clinical evaluations of drugs and biopharmaceutical products in biological systems. This program provides students with an interdisciplinary background in bioanalytical principles and methods and applications of analytical chemistry to detection, characterization, and qualitative, quantitative, and instrumental analysis of biologically active molecules in biological systems. The program prepares majors with a strong background in traditional chemistry areas and the technical skills to develop a career in bioanalysis, biomedicine, biotechnology, clinical science, and pharmaceutical science.

Required Courses

Code	Title		Credit Hours
Bioanalytical Chemistry Requirements			**(51)**
CHEM 100	Intro to the Profession		2
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
CHEM 247	Analytical Chemistry		3
CHEM 321	Instrumental Analysis		4
CHEM 343	Physical Chemistry I		3
CHEM 344	Physical Chemistry II		4
CHEM 415	Inorganic Chemistry		3
CHEM 434	Spec Methods in Id and Analys		4
CHEM 460	Bioanalytical Chemistry		3
CHEM 461	Bioanalytical Chemistry Lab		3
CHEM 463	Analytical Method Develop Lab		3
CHEM 485	Chemistry Colloquium		1
CHEM 495	Seminar in Special Topics		1
Bioanalytical Chemistry Electives			**(6)**
Select two courses from the following:			6
CHEM 416	Advanced Chemistry Lab	3	
CHEM 452	Cheminformatics	3	
CHEM 467	Medicinal Chemistry	3	
CHEM 473	Environmental Analytical Chem	3	
CHEM 475	Forensic Chemistry	3	
CHEM 476	Forensic Chemistry Laboratory	3	
CHEM 513	Chemometrics & Statistics	3	
CHEM 538	Physical Biochemistry	3	
Biology Requirements			**(6-7)**
BIOL 107	General Biol Lecture		3
or BIOL 115	Human Biology		
BIOL 401	Introductory Biochemistry		3-4
or BIOL 403	Biochemistry		
Mathematics Requirements			**(18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4

PHYS 221	Gen Physics II: Elect&Magntism	4
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(9)**
Select nine credit hours [1]		9
Total Credit Hours		127-128

1 Suggested electives include: BIOL 210, BIOL 445, BIOL 514, BIOL 527, BIOL 550, ITMD 521, ITMD 525, and ITMD 527.

Bachelor of Science in Bioanalytical Chemistry Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 124	4	CHEM 100	2
CS 105 or 110	2	CHEM 125	4
MATH 151	5	MATH 152	5
Humanities 200-level Course	3	PHYS 123	4
		Social Sciences Elective	3
	14		18
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 237	4	CHEM 239	3
BIOL 107 or 115	3	CHEM 240	2
MATH 251	4	CHEM 247	3
PHYS 221	4	MATH 252	4
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	18		15
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 321	4	CHEM 344	4
CHEM 343	3	CHEM 434	4
IPRO Elective I	3	CHEM 460	3
Social Sciences Elective (300+)	3	CHEM 485	1
Free Elective[1]	3	Humanities Elective (300+)	3
	16		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 401 or 403	3-4	CHEM 495	1
CHEM 415	3	Bioanalytical Chemistry Elective[2]	3
CHEM 461	3	Bioanalytical Chemistry Elective[2]	3
CHEM 463	3	IPRO Elective II	3
Free Elective[1]	3	Social Sciences Elective (300+)	3
		Free Elective[1]	3
	15-16		16

Total Credit Hours: 127-128

1 Suggested electives include: BIOL 210, BIOL 445, BIOL 514, BIOL 527, BIOL 550, ITMD 521, ITMD 525, and ITMD 527.

2 Choose from the following courses: CHEM 416, CHEM 452, CHEM 467, CHEM 473, CHEM 475, CHEM 476, CHEM 513, or CHEM 538.

Bachelor of Science in Chemistry

Chemistry is the study of the miniaturized world of atoms and molecules. Chemists analyze the structure of this world of chemicals, discover the forces that govern chemical changes, and invent chemical reactions which create new molecules and materials for the benefit of mankind. For example, most of the clothes we wear and the containers that hold our food are made of synthetic fibers and polymers that were conceived and developed by chemists. Life-saving pharmaceuticals are designed and synthesized by chemists. The development of insecticides, cosmetics, fragrances, fertilizers, and high-tech materials are other examples of the impact of chemistry on society. The objective of the Illinois Institute of Technology undergraduate program in chemistry is to provide rigorous education in the fundamental areas of chemical theory and chemical experimentation. Students become well-trained for industrial careers in research and development, chemical analysis, or chemical manufacturing and marketing. The opportunity for participation in an original research project also provides the necessary experiences for entrance into graduate school in one of the chemical sciences. In addition, the undergraduate program in chemistry provides excellent pre-professional training for careers in medicine (see Preparatory Program for Medical Studies and science.iit.edu/pre-medicine), law, business, and other areas of science and healthcare. Students learn not only the basic science of chemistry but also the practical aspects of the discipline and its numerous applications. The Bachelor of Science in Chemistry degree is approved by the American Chemical Society Committee on Professional Training.

Coursework

The first stage of undergraduate training provides a solid foundation in all of the five basic areas of chemistry (analytical, inorganic, organic, physical, and biochemistry). Most of these courses include required laboratory work. These laboratories provide extensive practical exposure to each of these areas and experience with modern chemical instrumentation such as nuclear magnetic resonance spectroscopy, infrared spectroscopy, and gas and high-pressure liquid chromatography. Concurrently, students take courses to strengthen their understanding of mathematics and physics. Students are invited and encouraged to attend weekly chemistry colloquia where lectures are given by prominent chemists from industrial, governmental, and academic laboratories. In the second stage, students take advanced and specialized courses which focus on career interests. Students are encouraged to participate in a research project under the supervision of a member of the chemistry faculty. This research may lead to a senior thesis. Students may receive certification of their Bachelor of Science in Chemistry degree through the American Chemical Society (acs.org) by selection of appropriate chemistry electives.

Required Courses

Code	Title	Credit Hours
Chemistry Requirements		**(54)**
CHEM 100	Intro to the Profession	2
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Lab	2
CHEM 247	Analytical Chemistry	3
CHEM 321	Instrumental Analysis	4
CHEM 343	Physical Chemistry I	3
CHEM 344	Physical Chemistry II	4
CHEM 415	Inorganic Chemistry	3
CHEM 416	Advanced Chemistry Lab	3
CHEM 434	Spec Methods in Id and Analys	4
CHEM 451	Undergraduate Seminar	3
CHEM 485	Chemistry Colloquium	1
CHEM 485	Chemistry Colloquium	1
Select two CHEM electives [1]		6
Biology Requirements		**(6-7)**
BIOL 107	General Biol Lecture	3
or BIOL 115	Human Biology	
BIOL 401	Introductory Biochemistry	3-4
or BIOL 403	Biochemistry	
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5

MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(12)**
Select 12 credit hours		12
Total Credit Hours		127-128

[1] Students may choose from CHEM 410, CHEM 450, CHEM 454, CHEM 455, CHEM 470, CHEM 487, and CHEM 500+ level courses. Students planning on taking CHEM 487 must complete CHEM 450 in a previous semester and are only required to take one semester of CHEM 485.

Bachelor of Science in Chemistry Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 124	4	CHEM 100	2
CS 105 or 110	2	CHEM 125	4
MATH 151	5	MATH 152	5
Humanities 200-level Course	3	PHYS 123	4
		Social Sciences Elective	3
	14		18
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 237	4	CHEM 239	3
BIOL 107 or 115	3	CHEM 240	2
MATH 251	4	CHEM 247	3
PHYS 221	4	MATH 252	4
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	18		15
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 321	4	CHEM 344	4
CHEM 343	3	CHEM 434	4
Chemistry Elective[1]	3	CHEM 485	1
IPRO Elective I	3	Humanities Elective (300+)	3
Social Sciences Elective (300+)	3	Free Elective	3
	16		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 415	3	CHEM 416	3
CHEM 451	3	CHEM 485	1
BIOL 401 or 403	3-4	Chemistry Elective[1]	3
Free Elective	3	IPRO Elective II	3
Free Elective	3	Social Sciences Elective (300+)	3
		Free Elective	3
	15-16		16

Total Credit Hours: 127-128

[1] Students may choose from CHEM 410, CHEM 450, CHEM 454, CHEM 455, CHEM 470, CHEM 487, and CHEM 500+ courses. Students planning on taking CHEM 487 must take CHEM 450 in a previous semester and are only required to take one semester of CHEM 485.

Note: CHEM 321, CHEM 434, CHEM 415, and CHEM 451 are not offered every semester. The curriculum may differ in semesters five through eight depending on course offerings.

Optional Chemistry Degree Program Course Requirements

Students choosing to pursue the optional degree program below must take the following prescribed courses as chemistry and free electives.

Premedical Program for Chemistry Majors

Program Adviser: K. Spink

Students majoring in chemistry can earn a Bachelor of Science in Chemistry degree and, at the same time, fulfill the prerequisites for medical school. For detailed information, visit the Premedical Program website (science.iit.edu/pre-medicine). The following is a list of university science courses that fulfill the premedical requirements of most medical schools:

BIOL 107	General Biology Lectures	3
BIOL 109	General Biology Laboratory	1
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 124	Principles of Chemistry I with Laboratory	4
CHEM 125	Principles of Chemistry II with Laboratory	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Laboratory	2
PHYS 123	General Physics I: Mechanics	4
PHYS 221	General Physics II: Electricity and Magnetism	4

Bachelor of Science in Computational Chemistry and Biochemistry

Computational chemistry and biochemistry is the application of computational methods to understand chemical and biochemical properties and processes. Majors in this program will learn chemical and molecular modeling and simulation, computational chemical biology, computational drug design, big data in chemistry and biochemistry, and computational methods for data analytics. Students will be prepared to advance in the rapidly growing fields of computational and data science, gaining a strong background in traditional chemistry areas combined with relevant and advanced skills in experimental and computational science.

Required Courses

Code	Title		Credit Hours
Computational Chemistry and Biochemistry Requirements			**(45)**
CHEM 100	Intro to the Profession		2
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 247	Analytical Chemistry		3
CHEM 343	Physical Chemistry I		3
CHEM 344	Physical Chemistry II		4
CHEM 415	Inorganic Chemistry		3
CHEM 434	Spec Methods in Id and Analys		4
CHEM 452	Cheminformatics		3
CHEM 454	Computational Quantum Chem		3
CHEM 456	Computational Biochem/Drug Des		3
CHEM 485	Chemistry Colloquium		1
CHEM 495	Seminar in Special Topics		1
Computational Chemistry and Biochemistry Elective			**(3)**
Select one course from the following:			3
CHEM 240	Organic Chemistry Lab	2	
CHEM 321	Instrumental Analysis	4	
CHEM 416	Advanced Chemistry Lab	3	
CHEM 455	Advanced Organic Chemistry	3	
CHEM 467	Medicinal Chemistry	3	
CHEM 513	Chemometrics & Statistics	3	
CHEM 538	Physical Biochemistry	3	
CHEM 550	Chemical Bonding	3	
Biology Requirements			**(9)**
BIOL 107	General Biol Lecture		3
or BIOL 115	Human Biology		
BIOL 401	Introductory Biochemistry		3
BIOL 402	Metabolic Biochemistry		3
Mathematics Requirements			**(18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
Computer Science Requirement			**(9)**
CS 105	Intro to Computer Programming		2
or CS 110	Computing Principles		
CS 201	Accelerated Intro to Cmptr Sci		4

CS 331	Data Structures and Algorithms	3
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(9)**
Select nine credit hours [1]		9
Total Credit Hours		128

1 Suggested electives include: BIOL 550, CS 411, CS 422, CS 425, ITMD 521, ITMD 525, ITMD 527, ITMD 529, MATH 474, and PHYS 240.

Bachelor of Science in Computational Chemistry and Biochemistry Curriculum

Year 1			
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 124	4	CHEM 100	2
CS 105 or 110	2	CHEM 125	4
MATH 151	5	MATH 152	5
Humanities 200-level Course	3	PHYS 123	4
		Social Sciences Elective	3
	14		18

Year 2			
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 237	4	CHEM 239	3
BIOL 107 or 115	3	CHEM 247	3
MATH 251	4	CS 201	4
PHYS 221	4	MATH 252	4
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	18		17

Year 3			
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 343	3	BIOL 401	3
CS 331	3	CHEM 344	4
IPRO Elective I	3	CHEM 434	4
Humanities Elective (300+)	3	CHEM 485	1
Social Sciences Elective (300+)	3	Free Elective[1]	3
	15		15

Year 4			
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 402	3	CHEM 452	3
CHEM 415	3	CHEM 454	3
CHEM 456	3	CHEM 495	1
IPRO Elective II	3	Computational Chemistry and Biochemistry Elective[2]	3
Social Sciences Elective (300+)	3	Free Elective[1]	3
		Free Elective[1]	3
	15		16

Total Credit Hours: 128

1 Suggested electives include: BIOL 550, CS 411, CS 422, CS 425, ITMD 521, ITMD 525, ITMD 527, ITMD 529, MATH 474, and PHYS 240.

2 Choose from the following courses: CHEM 240, CHEM 321, CHEM 416, CHEM 455, CHEM 467, CHEM 513, CHEM 538, or CHEM 550.

Bachelor of Science in Environmental Chemistry

Environmental chemistry is a study of chemical principles and methodologies applicable to environmental phenomena and issues. The objective of this chemistry-focused environmental science program is to provide students with a rigorous education in traditional chemistry areas and a structured and interdisciplinary training crossing chemistry and environmental science. The program will provide students with a fundamental understanding of current environmental issues such as pollution of air and water, waste and recycling, and climate change, as well as a solid background in environmental chemical and instrumental analysis. Majors will gain the technical skills to work in atmospheric science, hydrologic science, environmental science, environmental analytical chemistry, environmental toxicology, and environmental health science.

Required Courses

Code	Title		Credit Hours
Environmental Chemistry Requirements			**(51)**
CHEM 100	Intro to the Profession		2
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
CHEM 247	Analytical Chemistry		3
CHEM 321	Instrumental Analysis		4
CHEM 343	Physical Chemistry I		3
CHEM 344	Physical Chemistry II		4
CHEM 415	Inorganic Chemistry		3
CHEM 434	Spec Methods in Id and Analys		4
CHEM 463	Analytical Method Develop Lab		3
CHEM 472	Environmental Chemistry		3
CHEM 473	Environmental Analytical Chem		3
CHEM 485	Chemistry Colloquium		1
CHEM 495	Seminar in Special Topics		1
Environmental Chemistry Electives			**(6)**
Select two courses from the following:			6
CHEM 410	Science of Climate Change	3	
CHEM 416	Advanced Chemistry Lab	3	
CHEM 452	Cheminformatics	3	
CHEM 460	Bioanalytical Chemistry	3	
CHEM 461	Bioanalytical Chemistry Lab	3	
CHEM 467	Medicinal Chemistry	3	
CHEM 475	Forensic Chemistry	3	
CHEM 476	Forensic Chemistry Laboratory	3	
CHEM 500	Advanced Analytical Chemistry	3	
CHEM 513	Chemometrics & Statistics	3	
CHEM 538	Physical Biochemistry	3	
Biology Requirements			**(6-7)**
BIOL 107	General Biol Lecture		3
or BIOL 115	Human Biology		
BIOL 401	Introductory Biochemistry		3-4
or BIOL 403	Biochemistry		
Mathematics Requirements			**(18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4

Physics Requirements		**(8)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(9)**
Select nine credit hours [1]		9
Total Credit Hours		127-128

1 Suggested electives include: BIOL 210, BIOL 445, BIOL 514, ENVE 404, ENVE 463, ITMD 521, ITMD 525, and ITMD 527.

Bachelor of Science in Environmental Chemistry Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 124	4	CHEM 100	2
CS 105 or 110	2	CHEM 125	4
MATH 151	5	MATH 152	5
Humanities 200-level Course	3	PHYS 123	4
		Social Sciences Elective	3
	14		18
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 237	4	CHEM 239	3
BIOL 107 or 115	3	CHEM 240	2
MATH 251	4	CHEM 247	3
PHYS 221	4	MATH 252	4
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	18		15
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 321	4	CHEM 344	4
CHEM 343	3	CHEM 434	4
IPRO Elective I	3	CHEM 472	3
Social Sciences Elective (300+)	3	CHEM 485	1
Free Elective[1]	3	Humanities Elective (300+)	3
	16		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 401 or 403	3-4	CHEM 495	1
CHEM 415	3	Environmental Chemistry Elective[2]	3
CHEM 463	3	Environmental Chemistry Elective[2]	3
CHEM 473	3	IPRO Elective II	3
Free Elective[1]	3	Social Sciences Elective (300+)	3
		Free Elective[1]	3
	15-16		16

Total Credit Hours: 127-128

1 Suggested electives include: BIOL 210, BIOL 445, BIOL 514, ENVE 404, ENVE 463, ITMD 521, ITMD 525, and ITMD 527.

2 Choose from the following courses: CHEM 410, CHEM 416, CHEM 452, CHEM 460, CHEM 461, CHEM 467, CHEM 475, CHEM 476, CHEM 500, CHEM 513, or CHEM 538.

Bachelor of Science in Forensic Chemistry

Forensic chemistry is the application of chemistry to forensic investigation. The objective of the program is to provide students with a strong background in both traditional chemistry areas and chemical and biochemical applications for analysis, detection, and characterization of forensic and controlled substances. This chemistry-centered forensic science program will prepare students with a systematic training in chemical science and chemical, biochemical, and instrumental analysis for forensic applications. Majors will gain technical skills to develop a career in forensic science, forensic medicine, forensic drug analysis, toxicology, DNA analysis, health care, or criminalistics.

Required Courses

Code	Title		Credit Hours
Forensic Chemistry Requirements			**(51)**
CHEM 100	Intro to the Profession		2
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
CHEM 247	Analytical Chemistry		3
CHEM 321	Instrumental Analysis		4
CHEM 343	Physical Chemistry I		3
CHEM 344	Physical Chemistry II		4
CHEM 415	Inorganic Chemistry		3
CHEM 434	Spec Methods in Id and Analys		4
CHEM 463	Analytical Method Develop Lab		3
CHEM 475	Forensic Chemistry		3
CHEM 476	Forensic Chemistry Laboratory		3
CHEM 485	Chemistry Colloquium		1
CHEM 495	Seminar in Special Topics		1
Forensic Chemistry Electives			**(6)**
Select two courses from the following:			6
CHEM 416	Advanced Chemistry Lab	3	
CHEM 452	Cheminformatics	3	
CHEM 460	Bioanalytical Chemistry	3	
CHEM 461	Bioanalytical Chemistry Lab	3	
CHEM 467	Medicinal Chemistry	3	
CHEM 472	Environmental Chemistry	3	
CHEM 473	Environmental Analytical Chem	3	
CHEM 500	Advanced Analytical Chemistry	3	
CHEM 513	Chemometrics & Statistics	3	
CHEM 538	Physical Biochemistry	3	
Biology Requirements			**(6-7)**
BIOL 107	General Biol Lecture		3
or BIOL 115	Human Biology		
BIOL 401	Introductory Biochemistry		3-4
or BIOL 403	Biochemistry		
Mathematics Requirements			**(18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4

PHYS 221	Gen Physics II: Elect&Magntism	4
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(9)**
Select nine credit hours [1]		9
Total Credit Hours		127-128

1 Suggested electives include: BIOL 210, BIOL 214, BIOL 445, BIOL 514, BIOL 550, ITMD 521, ITMD 525, ITMD 527, and ITMS 538.

Bachelor of Science in Forensic Chemistry Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 124	4	CHEM 100	2
CS 105 or 110	2	CHEM 125	4
MATH 151	5	MATH 152	5
Humanities 200-level Course	3	PHYS 123	4
		Social Sciences Elective	3
	14		18
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 237	4	CHEM 239	3
BIOL 107 or 115	3	CHEM 240	2
MATH 251	4	CHEM 247	3
PHYS 221	4	MATH 252	4
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	18		15
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 321	4	CHEM 344	4
CHEM 343	3	CHEM 434	4
IPRO Elective I	3	CHEM 475	3
Social Sciences Elective (300+)	3	CHEM 485	1
Free Elective[1]	3	Humanities Elective (300+)	3
	16		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 401 or 403	3-4	CHEM 495	1
CHEM 415	3	Forensic Chemistry Elective[2]	3
CHEM 463	3	Forensic Chemistry Elective[2]	3
CHEM 476	3	IPRO Elective II	3
Free Elective[1]	3	Social Sciences Elective (300+)	3
		Free Elective[1]	3
	15-16		16

Total Credit Hours: 127-128

1. Suggested electives include: BIOL 210, BIOL 214, BIOL 445, BIOL 514, BIOL 550, ITMD 521, ITMD 525, ITMD 527, and ITMS 538.
2. Choose from the following courses: CHEM 416, CHEM 452, CHEM 460, CHEM 461, CHEM 467, CHEM 472, CHEM 473, CHEM 500, CHEM 513, or CHEM 538.

Bachelor of Science in Medicinal Chemistry

Medicinal chemistry is a specialized area of chemistry with an emphasis on a study of drug design, drug synthesis, and pharmaceutical and biomedical analysis. The program will provide students with a strong background in traditional chemistry areas as well as a fundamental understanding of chemistry and biological and pharmacological actions of pharmaceuticals and biomedical products. Students will learn to apply biological, chemical, and data science to computer-aided design, synthesis, evaluation, and analysis of structurally diverse drugs for the detection, treatment, and cure of human diseases. The program will prepare students with the technical skills to develop a career in biomedical science, bioanalytical science, biotechnology, medicine, and pharmaceutical science.

Required Courses

Code	Title		Credit Hours
Medicinal Chemistry Requirements			**(51)**
CHEM 100	Intro to the Profession		2
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
CHEM 247	Analytical Chemistry		3
CHEM 321	Instrumental Analysis		4
CHEM 343	Physical Chemistry I		3
CHEM 344	Physical Chemistry II		4
CHEM 415	Inorganic Chemistry		3
CHEM 434	Spec Methods in Id and Analys		4
CHEM 456	Computational Biochem/Drug Des		3
CHEM 463	Analytical Method Develop Lab		3
CHEM 467	Medicinal Chemistry		3
CHEM 485	Chemistry Colloquium		1
CHEM 495	Seminar in Special Topics		1
Medicinal Chemistry Electives			**(6)**
Select two courses from the following:			6
CHEM 416	Advanced Chemistry Lab	3	
CHEM 452	Cheminformatics	3	
CHEM 455	Advanced Organic Chemistry	3	
CHEM 460	Bioanalytical Chemistry	3	
CHEM 461	Bioanalytical Chemistry Lab	3	
CHEM 473	Environmental Analytical Chem	3	
CHEM 476	Forensic Chemistry Laboratory	3	
CHEM 513	Chemometrics & Statistics	3	
CHEM 538	Physical Biochemistry	3	
Biology Requirements			**(6-7)**
BIOL 107	General Biol Lecture		3
or BIOL 115	Human Biology		
BIOL 401	Introductory Biochemistry		3-4
or BIOL 403	Biochemistry		
Mathematics Requirements			**(18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4

Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(9)**
Select nine credit hours [1]		9
Total Credit Hours		127-128

1 Suggested electives include: BIOL 210, BIOL 445, BIOL 514, BIOL 527, BIOL 550, ITMD 521, ITMD 525, and ITMD 527.

Bachelor of Science in Medicinal Chemistry

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 124	4	CHEM 100	2
CS 105 or 110	2	CHEM 125	4
MATH 151	5	MATH 152	5
Humanities 200-level Course	3	PHYS 123	4
		Social Sciences Elective	3
	14		18
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 237	4	CHEM 239	3
BIOL 107 or 115	3	CHEM 240	2
MATH 251	4	CHEM 247	3
PHYS 221	4	MATH 252	4
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	18		15
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CHEM 321	4	CHEM 344	4
CHEM 343	3	CHEM 434	4
IPRO Elective I	3	CHEM 467	3
Social Sciences Elective (300+)	3	CHEM 485	1
Free Elective[1]	3	Humanities Elective (300+)	3
	16		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BIOL 401 or 403	3-4	CHEM 495	1
CHEM 415	3	Medicinal Chemistry Elective[2]	3
CHEM 456	3	Medicinal Chemistry Elective[2]	3
CHEM 463	3	IPRO Elective	3
Free Elective[1]	3	Social Sciences Elective (300+)	3
		Free Elective[1]	3
	15-16		16

Total Credit Hours: 127-128

1 Suggested electives include: BIOL 210, BIOL 445, BIOL 514, BIOL 527, BIOL 550, ITMD 521, ITMD 525, and ITMD 527.

2 Choose from the following courses: CHEM 416, CHEM 452, CHEM 455, CHEM 460, CHEM 461, CHEM 473, CHEM 476, CHEM 513, or CHEM 538.

Minor in Chemistry

Required Courses

Code	Title		Credit Hours
CHEM 247	Analytical Chemistry		3
Select one of the following course sequences:			7
CHEM 237 & CHEM 239	Organic Chemistry I and Organic Chemistry II	7	
CHEM 343 & CHEM 344	Physical Chemistry I and Physical Chemistry II	7	
Select electives chosen from 300-level and 400-level chemistry courses			5
Total Credit Hours			15

Food Science and Nutrition

Food Science and Nutrition
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Chair
Britt Burton-Freeman

Manager, Academic Programs and Initiatives
Todd Diel

Faculty with Research Interests
For more information regarding faculty visit the Department of Food Science and Nutrition website.

The Department of Food Science and Nutrition (FdSN) consists of Illinois Institute of Technology faculty, in collaboration with U.S. Food and Drug Administration (FDA) scientists, and food industry experts, and provides a unique training ground for individuals seeking graduate education in food safety and technology and food process engineering.

Illinois Tech's Bachelor of Science degree in Food Science and Nutrition prepares its graduates for careers that involve the application of science, technology, engineering and regulation to address modern-day food- and health-related problems. This unique program provides a foundation in food science and nutrition with contemporary practical training in topics pertinent to the food, manufacturing, pharma/biotech, and agricultural industries, including operations management, computation and data analytics, regulatory, and design thinking.

Our program, designed with input from the food industry and other related industries, develops professionals who understand how the food industry functions now, and will be capable of propelling that industry to where it needs to be in the future.

Graduates from the program are prepared to step into a multitude of roles, including digitally-enabled food production; application of new and emerging food processing technologies; food safety and regulatory compliance, application of novel techniques and ingredients in food product development and formulation testing, address issues of sustainable diets, and intersections between business, health, human behavior, global food economies, and resources.

Facilities

FdSN makes use of the facilities of Illinois Tech's Moffett campus - home of the university's Institute for Food Safety and Health (IFSH.) These facilities include 40,000 square feet of research laboratories, office and meeting space, 26,000 square feet of industrial scale pilot plant facility, 3,000 square feet of food processing plant (GMP), and 3,000 square feet of Biosafety Level-3 (BSL-3) Laboratory and Bio-containment Pilot Plant (BCPP). The research laboratory facilities at Moffett Campus include numerous laboratories for microbiology, virology, molecular biology, chemistry, biochemistry, nutrition, and engineering. A 5,000 square feet Clinical Nutrition Research Facility is also located at the university's Mies Campus. The pilot plant at IFSH houses state of the art equipment such as computer-controlled retorts, high temperature-short time plate pasteurizer, high pressure food processors for pasteurization and sterilization studies, equipment for aseptic processing of particulate foods, pulsed electric field apparatus, ozone processor, UV food processors, homogenizers, and high power ultrasound. The BSL-3 and BCPP provide an opportunity to conduct studies on control of pathogenic microorganisms using pilot-scale equipment. Further, microbiological, food engineering, chemical, and packaging laboratories support the pilot plant facilities. IFSH's food science and technology library provides both physical and systems access to current and retrospective research and technical publications. The 25,000 square feet of laboratories and facilities of the FDA Division of Food Processing Science and Technology physically located in the same building are also available to FdSN collaborative research projects.

Minor

Bachelor of Science in Food Science and Nutrition

Code	Title		Credit Hours
Food Science and Nutrition Requirements			**(39)**
FDSN 100	Introduction to the Profession		2
FDSN 201	Nutrition and Wellness		3
FDSN 300	Nutrition Thru the Life Cycle		3
FDSN 304	Food Biotechnology		3
FDSN 310	Food Chemistry with Lab		3
FDSN 311	Food Analysis and Properties		3
FDSN 320	Food Law, Labels & Hlth Claims		3
FDSN 401	Nutrition, Metabolism & Health		3
FDSN 405	Food and Behavior		3
FDSN 410	Food Plant Operations		3
FDSN 411	Food Microbiology with Lab		4
FDSN 412	Preservation Processing		3
FDSN 420	US Food Safety Reg Systems		3
Program Elective Courses			**(15)**
Select 15 credit hours			15
FDSN 210	Introduction to Culinology	2	
FDSN 301	Exploring Food Science & Tech	3	
FDSN 312	Food & Nat Products Toxicology	3	
FDSN 314	Sustainable Food Systems	3	
FDSN 316	Cultural Foods with Lab	3	
FDSN 318	Culinary Entrepreneurship	3	
FDSN 413	Food Fermentation with Lab	3	
FDSN 417	Mgmt of Food Quality Control	3	
FDSN 418	Introduction to Food Design	3	
Mathematics Requirements			**(8)**
MATH 151	Calculus I		5
or MATH 152	Calculus II		
MATH 225	Introductory Statistics		3
or MATH 425	Statistical Methods		
Science Requirements			**(22)**
BIOL 107	General Biol Lecture		3
BIOL 210	Microbiology		3
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
PHYS 123	General Physics I: Mechanics		4
Computer Science Requirements			**(2)**
CS 105	Intro to Computer Programming		2
or CS 110	Computing Principles		
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 25)			21
Interprofessional Project (IPRO) Requirements			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Technical Elective Requirements			**(3-4)**
Select 3-4 credit hours			3-4
BIOL 214	Genetics	3	
or BIOL 430	Human Physiology		
BIOL 403	Biochemistry	4	

or BIOL 404	Biochemistry Laboratory		
CHEM 239	Organic Chemistry II	3	
or CHEM 247	Analytical Chemistry		
Free Electives			**(12)**
Select 12 credit hours			12
Total Credit Hours			128-129

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
FDSN 100	2	BIOL 107	3
MATH 151	5	CHEM 125	4
CHEM 124	4	FDSN 201	3
CS 105	2	SOCIAL SCIENCES ELECTIVE	3
		HUMANITIES 200-LEVEL COURSE	3
	13		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
CHEM 237	4	MATH 225	3
BIOL 210	3	FDSN 310	3
PHYS 123	4	FDSN 300	3
FDSN ELECTIVE	3	NON-FDSN ELECTIVE[1]	3
HUMANITIES OR SOCIAL SCIENCES ELECTIVE	3	HUMANITIES ELECTIVE (300+)	3
	17		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
FDSN 304	3	FDSN 401	3
FDSN 311	3	FDSN ELECTIVE	3
FDSN 320	3	IPRO 397	3
CHEM/BIO TECHNICAL ELECTIVE	3	FDSN ELECTIVE	3
HUMANITIES ELECTIVE (300+)	3	NON-FDSN ELECTIVE[1]	3
NON-FDSN ELECTIVE[1]	3	SOCIAL SCIENCES ELECTIVE (300+)	3
	18		18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
IPRO 497	3	FDSN 412	3
FDSN 420	3	FDSN 411	4
FDSN ELECTIVE	3	FDSN ELECTIVE	3
FDSN 410	3	FDSN 430	3
SOCIAL SCIENCES ELECTIVE (300+)	3	NON-FDSN ELECTIVE[1]	3
	15		16

Total Credit Hours: 128

1 Taken in consultation with Advisor

Minor in Food Science and Nutrition

Required Courses

Code	Title	Credit Hours
FDSN 201	Nutrition and Wellness	3
FDSN 300	Nutrition Thru the Life Cycle	3
FDSN 301	Exploring Food Science & Tech	3
FDSN 401	Nutrition, Metabolism & Health	3
FDSN 405	Food and Behavior	3
Total Credit Hours		15

Humanities

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Chair
Matthew Bauer

Associate Chair
Warren Schmaus

Faculty with Research Interests
For information regarding faculty visit the Department of Humanities website.

The Department of Humanities offers Bachelor of Science (B.S.) degrees in humanities (HUM), digital humanities (DHUM), and communication (COM). The HUM degree is a flexible liberal arts degree, and students may specialize in history, literature, philosophy, communication, or art and architectural history. Students taking the DHUM degree have two specializations: a three-course set in a traditional area of the humanities such as history, philosophy, etc; and a five-course digital specialization in information architecture, technical communication, or science and technology studies. Students pursuing the COM degree specialize in professional and technical communication, journalism of science, or journalism of technology and business. The department offers courses in art and architectural history, communication, history, literature, and philosophy.

The Department of Humanities also offers academic minors in communication, English language and literature, history, linguistics, literature, philosophy, professional and technical communication, and web communication. A minor in urban studies is also offered in conjunction with the Department of Social Sciences.

The department has these five undergraduate educational objectives:

- To offer and support the B.S. degree programs and the academic minors.
- To provide students the opportunity to pursue personal interests in the humanities. This objective is achieved through offering a wide range of advanced courses in the many disciplines that comprise the humanities. The department also encourages students to take minors in literature, history, and philosophy.
- To strengthen the ability of all university students to formulate and express ideas in a variety of formats. In addition to composition courses for both native and non-native English speakers, the department supports the Writing Center, where students receive one-on-one tutoring at their convenience. Undergraduates who qualify may also take advanced courses in writing. Advanced courses provide further exposure to critical thinking and to the communication of ideas.
- To support the requirements of all of the university's professional degree programs. Courses marked with (H) satisfy degree requirements in general education. The department also offers specialized courses (such as architectural history) that meet the educational needs of specific degree programs. The department offers many courses of special relevance to students preparing for careers in the law in the university's Honors Law Program.
- To enable all students to enrich their professional and personal lives. This goal is achieved through advanced elective courses in the humanities, which provide an appreciation and understanding of human development and the foundations and diverse expressions of human experience, particularly as reflected in history, literature, and philosophy.

Illinois Institute of Technology students are encouraged to broaden their educational backgrounds and to discover new interests through the study of humanities.

The Department of Humanities considers the advising of students an important obligation. Each semester, all students majoring in HUM, DHUM, or COM must meet with their faculty advisers during the advising period. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements of the degree programs.

Degree Programs

- Bachelor of Science in Communication: General Communication
- Bachelor of Science in Communication: Journalism of Science
- Bachelor of Science in Communication: Journalism of Technology and Business
- Bachelor of Science in Communication: Professional and Technical Communication
- Bachelor of Science in Digital Humanities
- Bachelor of Science in Humanities

Minors

- Minor in Communication (p. 250)
- Minor in English Language and Literature (p. 250)
- Minor in Game Studies and Design (p. 250)
- Minor in History (p. 250)
- Minor in Information Architecture (p. 251)
- Minor in Linguistics (p. 251)
- Minor in Literature (p. 251)
- Minor in Philosophy (p. 251)
- Minor in Policy and Ethics (p. 252)
- Minor in Professional and Technical Communication (p. 252)
- Minor in Science and Technology Studies (p. 253)
- Minor in Urban Studies (p. 253)

Bachelor of Science in Communication: General Communication

Students earning the communication degree specialize in one of four areas: general communication, journalism of science (JS), journalism of technology and business (JTB), or professional and technical communication (PTC). All COM majors take coursework in editing, persuasion, communication law and ethics, and science and technology in society. General communicators have a great deal of leeway to tailor coursework to their own particular interests.

Required Courses

Code	Title		Credit Hours
Communication Requirements			**(9)**
COM 371	Persuasion		3
COM 377	Communication Law Ethics		3
COM 425	Editing		3
Portfolio			
General Communications Requirements			**(18)**
Select a minimum of six courses from the following:			18
COM 301	Intro Linguistics	3	
COM 330	Standards-Based Web Design	3	
COM 372	Mass Media Society	3	
COM 380	Topics in Communication (Organizational Communication)	3	
COM 380	Topics in Communication (Communication/Media Theory)	3	
COM 421	Technical Communication	3	
COM 428	Verbal Visual Communications	3	
COM 435	Intercultural Communication	3	
COM 440	Introduction to Journalism	3	
Communication/Technical Electives			**(18)**
Select a minimum of six courses			18
Science and Technology in Society (STS Elective)			**(6)**
Select six credit hours			6
Introduction to the Profession			**(3)**
See Illinois Tech Core Curriculum, section E (p. 25)			3
Science Requirements			**(10)**
See Illinois Tech Core Curriculum, section D (p. 25)			10
Mathematics Requirement			**(6)**
See Illinois Tech Core Curriculum, section D (p. 25)			6
Computer Science Requirement			**(2)**
See Illinois Tech Core Curriculum, section D (p. 25)			2
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Minor Electives			**(15)**
Select 15 credit hours			15
Free Electives			**(12)**
Select 12 credit hours			12
Total Credit Hours			126

Bachelor of Science in Communication: General Communication Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
Introduction to the Profession	3	CS 105 or 110	2
MATH 130	3	Communications Core Course[1]	3
Natural Science or Engineering Elective	4	Natural Science or Engineering Elective	3
Humanities 200-level Course	3	Humanities Elective (300+)	3
Social Science Elective	3	Free Elective	3
	16		14

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
COM 377	3	COM 371	3
Communications Core Course[1]	3	STS Elective[2]	3
Communication/Technical Elective	3	Minor Elective	3
Natural Science or Engineering Elective	3	Humanities Elective (300+)	3
STS Elective[2]	3	Free Elective	3
Social Sciences Elective (300+)	3		
	18		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
Communications Core Course[1]	3	COM 425	3
Minor Elective	3	Communications Core Course[1]	3
IPRO Elective I	3	Communication/Technical Elective	3
Humanities or Social Sciences Elective	3	Minor Elective	3
Social Sciences Elective (300+)	3	Mathematics Elective	3
Free Elective	3		
	18		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
Communications Core Course[1]	3	Communications Core Course[1]	3
Communication/Technical Elective	3	Communication/Technical Elective	3
Communication/Technical Elective	3	Communication/Technical Elective	3
Minor Elective	3	Minor Elective	3
IPRO Elective II	3	Free Elective	3
	15		15

Total Credit Hours: 126

1. Communications core courses include: COM 301, COM 323, COM 330, COM 380 Organizational Communication, COM 380 Communication/Media Theory, COM 421, COM 428, COM 435, and COM 440.
2. Select from: PHIL 341, PHIL 350, or PHIL 351.

Bachelor of Science in Communication: Journalism of Science

Students earning the communication degree specialize in one of four areas: general communication, journalism of science (JS), journalism of technology and business (JTB), or professional and technical communication (PTC). All COM majors take coursework in editing, persuasion, communication law and ethics, and science and technology in society. Journalism specialists add courses in journalism, mass media, and intercultural communication, and JS specialists also take a significant amount of coursework in math and science (with a good deal of choice in the focus of those courses), science writing, and philosophy of science.

Required Courses

Code	Title		Credit Hours
Communication Requirements			**(9)**
COM 371	Persuasion		3
COM 377	Communication Law Ethics		3
COM 425	Editing		3
Portfolio			
Journalism Requirements			**(12)**
COM 323	Communicating Science		3
COM 372	Mass Media Society		3
COM 435	Intercultural Communication		3
COM 440	Introduction to Journalism		3
Mathematics Requirement			**(5)**
MATH 151	Calculus I		5
Science Requirements			**(11)**
BIOL 107	General Biol Lecture		3
CHEM 124	Princ of Chemistry I with Lab		4
PHYS 123	General Physics I: Mechanics		4
Science Elective			**(3-4)**
Select one of the following:			3-4
BIOL 114	Introduction to Human Biology	3	
or BIOL 115	Human Biology		
CHEM 125	Prin of Chemistry II w/Lab	4	
or CHEM 126	Principles Chemistry II		
PHYS 221	Gen Physics II: Elect&Magntism	4	
Mathematics and Science Electives			**(21)**
Select 21 credit hours			21
Computer Science Requirement			**(2)**
See Illinois Tech Core Curriculum, section D (p. 25)			2
Science and Technology in Society (STS) Electives			**(6)**
Select six credit hours from the following:			6
PHIL 341	Philosophy of Science	3	
PHIL 350	Science and Method	3	
PHIL 351	Science and Values	3	
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Introduction to the Profession			**(3)**
Select three credit hours			3
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Minor Electives			**(15)**
Recommended minors include: Biology, Chemistry, or Physics			15
Free Electives			**(12)**

Select 12 credit hours	12
Total Credit Hours	126-127

Bachelor of Science in Communication: Journalism of Science Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
Introduction to the Profession	3	CS 105 or 110	2
MATH 151	5	CHEM 124	4
BIOL 107	3	COM 372	3
Humanities 200-level Course	3	Humanities Elective (300+)	3
Social Sciences Elective	3	Free Elective	3
	17		15

			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
COM 323	3	COM 371	3
COM 377	3	Minor Elective	3
PHYS 123	4	STS Elective[1]	3
Mathematics/Science Elective	3	Science Elective[2]	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
	16		15

			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
COM 435	3	COM 440	3
Minor Elective	3	Minor Elective	3
Mathematics/Science Elective	3	Mathematics/Science Elective	3
IPRO Elective I	3	Humanities or Social Sciences Elective	3
Social Sciences Elective (300+)	3	Free Elective	3
Free Elective	3		
	18		15

			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
STS Elective[1]	3	COM 425	3
Minor Elective	3	Minor Elective	3
Mathematics/Science Elective	3	Mathematics/Science Elective	3
Mathematics/Science Elective	3	Mathematics/Science Elective	3
IPRO Elective II	3	Free Elective	3
	15		15

Total Credit Hours: 126

1. Select from: PHIL 341, PHIL 350, or PHIL 351.
2. Select from: BIOL 114 or BIOL 115, CHEM 125 or CHEM 126, or PHYS 221.

Bachelor of Science in Communication: Journalism of Technology and Business

Students earning the communication degree specialize in one of four areas: general communication, journalism of science (JS), journalism of technology and business (JTB), or professional and technical communication (PTC). All COM majors take coursework in editing, persuasion, communication law and ethics, and science and technology in society. Journalism specialists add courses in journalism, mass media, and intercultural communication, and JTB specialists also take courses in economics, business, information technology, writing about technology, and history of technology.

Required Courses

Code	Title		Credit Hours
Communication Requirements			**(9)**
COM 371	Persuasion		3
COM 377	Communication Law Ethics		3
COM 425	Editing		3
Portfolio			
Journalism Requirements			**(12)**
COM 372	Mass Media Society		3
COM 421	Technical Communication		3
COM 435	Intercultural Communication		3
COM 440	Introduction to Journalism		3
Technology and Business Requirement			**(24)**
BUS 210	Accounting for Non-Business Ma		3
BUS 301	Organizational Behavior		3
or BUS 371	Marketing Fundamentals		
ECON 211	Principles of Economics		3
ITM 301	Intro OS and Hardware I		3
ITM 311	Intro to Software Development		3
ITMD 361	Fund of Web Development		3
ITMD 421			3
ITMO 440			3
Mathematics and Computer Science Requirement			**(7)**
See Illinois Tech Core Curriculum, section D (p. 25)			7
Natural Science and Engineering Requirements			**(11)**
See Illinois Tech Core Curriculum, section D (p. 25)			11
Science and Technology in Society (STS) Elective			**(6)**
Select one of the following:			6
HIST 375	History of Computing	3	
HIST 382	Technology in Hist 1500-1850	3	
HIST 383	Tech History 1850 Present	3	
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Introduction to the Profession			**(3)**
Select three credit hours			3
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Minor Electives			**(15)**
Recommended minors include: Business, Entrepreneurship, Computational Structures, Computer Architecture, Computer Networking, Internet Application Development, or Information Technology and Management.			15
Free Electives			**(12)**
Select 12 credit hours			12
Total Credit Hours			126

Bachelor of Science in Communication: Journalism of Technology and Business Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
Introduction to the Profession	3	CS 105 or 110	2
MATH 130	3	COM 372	3
Natural Science or Engineering Elective	4	Natural Science or Engineering Elective	4
Humanities 200-level Course	3	Humanities Elective (300+)	3
Social Sciences Elective	3	Free Elective	3
	16		15

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
COM 377	3	COM 371	3
COM 421	3	ECON 211	3
COM 435	3	STS Elective[1]	3
ITM 301	3	Minor Elective	3
Natural Science or Engineering Elective	3	Humanities Elective (300+)	3
Social Sciences Elective (300+)	3		
	18		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BUS 210	3	COM 440	3
Minor Elective	3	MATH 425	3
IPRO Elective I	3	ITM 311	3
Social Sciences Elective (300+)	3	Minor Elective	3
Humanities or Social Sciences Elective	3	Free Elective	3
Free Elective	3		
	18		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
ITMD 421	3	COM 425	3
BUS 301 or 371	3	ITMD 361	3
IPRO Elective II	3	ITMO 440	3
STS Elective[1]	3	Minor Elective	3
Minor Elective	3	Free Elective	3
	15		15

Total Credit Hours: 127

1 Select from: HIST 375, HIST 382, or HIST 383.

Bachelor of Science in Communication: Professional and Technical Communication (PTC)

Students earning the communication degree specialize in one of four areas: general communication, journalism of science (JS), journalism of technology and business (JTB), or professional and technical communication (PTC). All COM majors take coursework in editing, persuasion, communication law and ethics, and science and technology in society. PTC specialists add courses in document design, graphic and/or web design, linguistics, art and architectural history, and more.

Required Courses

Code	Title		Credit Hours
Communication Requirements			**(9)**
COM 371	Persuasion		3
COM 377	Communication Law Ethics		3
COM 425	Editing		3
Portfolio			
Professional and Technical Communication Requirements			**(9)**
COM 421	Technical Communication		3
COM 424	Document Design		3
COM 428	Verbal Visual Communications		3
Sequences			**(9)**
Select one of the following graphics sequences:			9
WebCom			
WebCom Sequence Option 1:			
COM 330	Standards-Based Web Design	3	
COM 331	Web Application Development	3	
COM 333	App Programming Interfaces	3	
WebCom Sequence Option 2:			
ITMD 361	Fund of Web Development	3	
ITMD 362	Human-Computer Interaction	3	
ITMD 462	Web Site App Development	3	
or ITMD 465	Rich Internet Applications		
Engineering Graphics			
EG 225	Eng Graphics for Non-Engineers	3	
EG 325	Adv Engg Graphics Non-Engineer	3	
EG 425	Cmptr Gphs for Non Engrs	3	
Science and Technology in Society (STS) Elective			**(6)**
Select six credit hours			6
Professional and Technical Communication (PTC) Electives			**(9)**
Select nine credit hours			9
PTC/STS Elective			**(3)**
Select three credit hours			3
Art and Architectural History (AAH) Elective			**(3)**
Select three credit hours			3
Linguistics Elective			**(3)**
Select three credit hours			3
Mathematics Requirements			**(5)**
See Illinois Tech Core Curriculum, section D (p. 25)			5
Natural Science and Engineering Requirements			**(11)**
See Illinois Tech Core Curriculum, section D (p. 25)			11
Computer Science Requirements			**(2)**
See Illinois Tech Core Curriculum, section D (p. 25)			2
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21

Introduction to the Profession	**(3)**
Select three credit hours	3
Interprofessional Projects (IPRO)	**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)	6
Minor Electives	**(15)**
Recommended minors include: Business, Entrepreneurship, Psychology, Sociology.	15
Free Electives	**(12)**
Select 12 credit hours	12
Total Credit Hours	126

Bachelor of Science in Communication: Professional and Technical Communication (PTC) Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
Introduction to the Profession	3	CS 105 or 110	2
MATH 130	3	Linguistics Elective	3
Natural Science or Engineering Elective	4	Natural Science or Engineering Elective	4
Humanities 200-level Course	3	Humanities Elective (300+)	3
Social Sciences Elective	3	Free Elective	3
	16		15
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
COM 377	3	COM 371	3
COM 421	3	Minor Elective	3
COM 424	3	STS Elective	3
Natural Science or Engineering Elective	3	Humanities Elective (300+)	3
AAH Elective	3	Free Elective	3
Social Sciences Elective	3		
	18		15
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
WebCom Course I	3	COM 425	3
IPRO Elective I	3	MATH 425	3
Humanities or Social Sciences Elective	3	WebCom Course II	3
Minor Elective	3	PTC Elective	3
Free Elective	3	Minor Elective	3
Social Sciences Elective (300+)	3		
	18		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
WebCom Course III	3	COM 428	3
STS Elective	3	Minor Elective	3
IPRO Elective II	3	PTC Elective	3
Minor Elective	3	STS/PTC Elective	3
PTC Elective	3	Free Elective	3
	15		15

Total Credit Hours: 127

Bachelor of Science in Digital Humanities (DHUM)

Digital humanities is the interdisciplinary study of traditional humanities subjects and concerns using digital technologies. The Bachelor of Science in Digital Humanities (DHUM) offers students a unique opportunity to combine humanistic inquiry in areas such as communication, history, language and linguistics, literature, and philosophy with a sophisticated skill set that is readily applicable to professional fields. Students majoring in digital humanities complete required courses that include training in research and writing skills as well as web and interactive design. Additionally, all students choose a traditional humanities specialization in history, literature, or philosophy; an interdisciplinary specialization; and a minor concentration. This enables them to develop deeper topical knowledge while pursuing the subjects they find most interesting. The digital humanities curriculum cultivates critical thinking and communication skills along with a host of technical proficiencies.

Required Courses

Code	Title	Credit Hours
Digital Humanities Requirement		**(20)**
HUM 208	Digital Culture	3
COM 201	Digital Writing	3
COM 330	Standards-Based Web Design	3
COM 331	Web Application Development	3
HIST 355	Digital Labor	3
HUM 380	Topics in Humanities (Digital Humanities Research Methods)	3
CS Elective		2
Digital Humanities Specialization		**(15)**
Select from the following: Game Studies and Design, Information Architecture, Policy and Ethics, or Science and Technology Studies. See the Specializations tab for complete descriptions.		15
Traditional Humanities Specialization		**(9)**
Select from the following: History, Linguistics, Literature, or Philosophy. Students may complete topically appropriate independent study courses to fulfill this requirement. See the Specializations tab for complete descriptions.		9
Minor Requirement		**(15)**
Recommended minors include: Business, Communication, Computer Networking, Database Management, Graphics and CAD (for non-engineers), Entrepreneurship, History, Internet Application Development, Linguistics, Literature, Military Science, Music, Naval Science, Philosophy, Political Science, Professional and Technical Communication, Psychology, Public Administration, Sociology, and Urban Studies.		15
Capstone Elective		**(6)**
Select six credit hours		6
Mathematics Requirements		**(5)**
See Illinois Tech Core Curriculum, section D (p. 25)		5
Computer Science Requirements		**(2)**
See Illinois Tech Core Curriculum, section D (p. 25)		2
Natural Science and Engineering Requirements		**(11)**
See Illinois Tech Core Curriculum, section D (p. 25)		11
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Introduction to the Profession		**(3)**
Select three credit hours		3
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(13)**
Select 13 credit hours		13
Total Credit Hours		126

Bachelor of Science in Digital Humanities (DHUM) Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
Introduction to the Profession	3	COM 201	3
HUM 208	3	CS 116	2
MATH 130	3	Social Sciences Elective	3
CS 115	2	Humanities or Social Science Elective	3
Free Elective	3	Free Elective	3
		Humanities 200-level Course	3
	14		17

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 105 & BIOL 109	4	COM 331	3
COM 330	3	HIST 355	3
HUM 380 (Digital Humanities Research Methods)	3	DHUM Specialization Course	3
Traditional Humanities Specialization Course	3	Minor Elective	3
Minor Elective	3	BIOL 114 & BIOL 117	4
	16		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
Science/Engineering Elective (not BIOL)	3	IPRO Elective I	3
Social Sciences Elective (300+)	3	Minor Elective	3
Minor Elective	3	MATH 425	3
DHUM Specialization Course	3	DHUM Specialization Course	3
Traditional Humanities Specialization Course	3	Traditional Humanities Specialization Course	3
Humanities Elective (300+)	3		
	18		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
DHUM Specialization Course	3	DHUM Specialization Course	3
Capstone Elective I	3	Capstone Elective II	3
Minor Elective	3	IPRO Elective II	3
Social Sciences Elective (300+)	3	Humanities Elective	3
Free Elective	3	Free Elective	3
	15		15

Total Credit Hours: 126

Digital Humanities Specializations and Minors

The digital humanities program incorporates specializations in interdisciplinary subject areas including information architecture, policy and ethics, and science and technology studies. Digital humanities majors complete five courses in one of these areas as part of their degree requirements. These specializations are also available as minors (p. 26) to students in other programs. These specializations provide opportunities for in-depth interdisciplinary study of topical areas. A detailed description for each specialization with a listing of course requirements is included below.

Game Studies and Design

The specialization in game studies and design provides students with theoretical, historical, and applied knowledge in the production and study of games. The specialization is relevant to students interested in pursuing careers in and around the games industry and is also relevant for those interested in careers in experience and interaction design, human computer interaction, and related areas.

Code	Title		Credit Hours
GSAD Foundations			**(9)**
HIST 373	History of Video Games		3
HUM 371	Fundamentals of Game Design		3
HUM 372	Interactive Storytelling		3
Technical Proficiency			**(3)**
Select a minimum of one course. Additional courses recommended.			3
CS 331	Data Structures and Algorithms	3	
CS 411	Computer Graphics	3	
CS 425	Database Organization	3	
CS 442	Mobile Application Development	3	
CS 481	Intllgnc Txt Analys Knwldg Mgm	3	
Theoretical Proficiency			**(3)**
Select a minimum of one course from the following:			3
PSYC 312	Human Motivation and Emotion	3	
PSYC 423	Learning Theory	3	
PSYC 426	Cognitive Science	3	
Total Credit Hours			15

Information Architecture

The information architecture specialization prepares students with a rich historical, theoretical, and practical foundation in technology and humanities for careers in web design/development, user experience and interface design, and other digital communications careers.

Code	Title		Credit Hours
COM 421	Technical Communication		3
or COM 428	Verbal Visual Communications		
Select two of the following (only one can be a COM 380):			6
COM 525	User Experience Research/Eval	3	
COM 528	Document Design	3	
COM 529	Technical Editing	3	
COM 380/580	Topics in Communication	3	
Select two of the following (only one can be a COM 380):			6
COM 541	Info Structure and Retrieval	3	
COM 542	Knowledge Management	3	
COM 543	Publication Management	3	
COM 380/580	Topics in Communication	3	
Total Credit Hours			15

Policy and Ethics

Students in the policy and ethics specialization study and analyze ethical and policy concerns in a variety of areas such as technology, urban and global development, and media. Policy and ethics is particularly relevant for students with an interest in public policy, nonprofit management, philosophy, law, and related fields.

Code	Title		Credit Hours
Philosophy			**(3)**
Select at least one course from the following:			3
PHIL 301	Ancient Philosophy	3	
PHIL 302	Origins of Modern Philosophy	3	
PHIL 305	20th-Century Philosophy	3	
PHIL 311	Great Philosophers	3	
PHIL 332	Political Philosophy	3	
PHIL 333	Social Philosophy	3	
Applied Ethics			**(3)**
Select at least one course from the following:			3
COM 377	Communication Law Ethics	3	
PHIL 351	Science and Values	3	
PHIL 370	Engineering Ethics	3	
PHIL 371	Ethics in Architecture	3	
PHIL 373	Business Ethics	3	
PHIL 374	Ethics in Computer Science	3	
Policy Fundamentals			**(3)**
Select one course from the following:			3
PS 306	Politics and Public Policy	3	
PS 313	Comparative Public Policy	3	
PS 408	Methods of Policy Analysis	3	
Specialized Policy Courses			**(6)**
Select two courses from the following: [1]			6
PS 338	Energy Policy	3	
SSCI 354	Urban Policy	3	
SSCI 380	International Development	3	
Total Credit Hours			15

1 Additional courses may apply to this area, with adviser approval.

Science and Technology Studies

Science and technology studies teaches students theories of techno-social growth and development through case studies of large technological systems. It trains students to analyze the ways in which technological growth re-engineers social relationships and how social relationships are in turn written into technological systems. Students with an interest in STS will find themselves well placed to thoughtfully and productively engage in a variety of areas that require a deep understanding of the interaction of large-scale technical and social systems. The knowledge and critical thinking skills learned in the STS subdiscipline can be deployed in public policy, journalism, academic or health administration, technical writing, and more. Note: Additional COM 380, HUM 380, and HIST 380 courses may also be approved depending on course content. 15 credit hours is required for this specialization.

Code	Title		Credit Hours
STS Foundation			**(3)**
Select one course from the following:			3
HUM 354	Science and Technology Studies	3	
PS 332	Politics of Sci and Technolgy	3	
STS Methods			**(3)**
Select a minimum of one course from the following:			3
COM 380	Topics in Communication	3	
PHIL 350	Science and Method	3	
SSCI 225	Geographic Information Systems	3	

SSCI 325	Intermediate Geo Info Systems	3	
STS Topics			**(6)**
Select a minimum of two courses from the following:			6
COM 372	Mass Media Society	3	
COM 377	Communication Law Ethics	3	
HIST 373	History of Video Games	3	
HIST 374	Disasters!	3	
HIST 375	History of Computing	3	
HIST 383	Tech History 1850 Present	3	
HUM 380	Topics in Humanities	3	
PHIL 341	Philosophy of Science	3	
PHIL 351	Science and Values	3	
PHIL 374	Ethics in Computer Science	3	
PS 332	Politics of Sci and Technolgy	3	
SOC 301	Social Dimension of Science	3	
SSCI 378	Innovation Policy	3	

Traditional Humanities Specializations

History

Choose a minimum of nine credit hours from any 300-level or higher HIST course.

Linguistics

Code	Title		Credit Hours
Select a minimum of nine credit hours from the following: [1]			9
COM 301	Intro Linguistics	3	
COM 306	World Englishes	3	
COM 308	Structure of Modern English	3	
COM 309	History English Language	3	
COM 310	The Human Voice	3	
COM 315	Discourse Analysis	3	
COM 435	Intercultural Communication	3	

[1] Other courses such as COM 380 Topics in Communication may be used toward the specialization, depending on the topic.

Literature

Choose a minimum of nine credit hours from any 300-level or higher LIT course.

Philosophy

Choose a minimum of nine credit hours from any 300-level or higher PHIL course.

Bachelor of Science in Humanities (HUM)

Illinois Institute of Technology's B.S. in Humanities is a flexible degree program aimed at students who are interested in the study of history, philosophy, and communication from a technological point of view, and in the study of science and technology from a humanistic point of view. This degree prepares students for graduate studies in the humanities and social sciences, and for advanced professional programs.

Within this major, students may choose concentrations in art and architectural history, digital humanities, literature, linguistics, philosophy, history, and communication. Students who choose philosophy, for example, would take eight of their eleven major courses in philosophy, for a total of 24 credit hours in philosophy. Students may also elect not to choose a concentration and to have a general humanities major.

This degree has three components:

- Illinois Tech Core Curriculum (47 credit hours)
- Major Coursework (33 credit hours)
- Minor[1]/Second Major/Free Electives (46 credit hours)

1 Students accepted into the Honors Law Program forgo the minor and most free electives and take all other coursework in the first three years.

Required Courses

1. **Illinois Tech Core Curriculum (47 credit hours)**
   Where unspecified, follow the bulletin guidelines: see Core Curriculum (p. 24).
   Basic Writing Proficiency
   Mathematics (5-6 credit hours)
   Computer Science (2 credit hours)
   Humanities and Social Sciences (21 credit hours)
   Natural Science or Engineering (10-11 credit hours)
   Interprofessional Projects (6 credit hours)
   ITP. Introduction to the Profession (2 credit hours)
   Note: A minimum of 16 credit hours is required between mathematics and natural science or engineering.
2. **The Major (33 credit hours)**
   Eleven courses in art and architectural history, communication, digital humanities, history, literature, philosophy, or courses offered by other departments that are approved by the student's HUM major adviser. At least eight of these courses should be at or above the 300-level.
   Students wishing to specialize should take at least eight courses (24 credit hours) in a particular discipline.
   Students planning to go on to graduate study in the humanities are encouraged to take at least one independent study course.
   For single majors, all major coursework is over and above the Illinois Tech Core Curriculum humanities requirements, and must be chosen in consultation with the student's academic adviser.
3. **Minor[1]/2nd Major/Free Electives (46 credit hours)**
   Total Hours: 126

1 Students accepted into the Honors Law Program forgo the minor and most free electives and take all other coursework in the first three years.

Bachelor of Science in Humanities Curriculum

Sample Program for Honors Law Program Students

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 151	5	CS 105	2
LCHS 100	2	Major Elective	3
Natural Science or Engineering Elective	4	Major Elective	3
Humanities 200-level Course	3	Natural Science or Engineering Elective	4
		Humanities Elective (300+)	3
		Social Sciences Elective	3
	14		18

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
Major Elective	3	IPRO Elective I	3
Major Elective	3	Major Elective	3
Natural Science or Engineering Elective	3	Major Elective	3
Humanities Elective (300+)	3	Free Elective	3
Humanities or Social Sciences Elective	3	Free Elective	3
		Social Sciences Elective (300+)	3
	15		18

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
IPRO Elective II	3	Major Elective	3
Major Elective	3	Major Elective	3
Major Elective	3	Major Elective	3
Major Elective	3	Free Elective	3
Social Sciences Elective (300+)	3	Free Elective	3
		Free Elective	3
	15		18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
Courses at Chicago-Kent College of Law	14	Courses at Chicago-Kent College of Law	14
	14		14

Total Credit Hours: 126

Minor in Communication

Required Courses

This minor consists of 15 credit hours of communication coursework chosen in consultation with the minor adviser. At least nine credit hours must be at or above the 300-level.

Minor in English Language and Literature

Required Courses

This minor consists of six credit hours of English linguistics courses, six credit hours of literature courses, and a three credit hour course in either English linguistics or literature. At least nine credit hours must be at or above the 300-level.

Minor in Game Studies and Design

Required Courses

The minor in Game Studies and Design provides students with theoretical, historical, and applied knowledge in the production and study of games. The minor is relevant to students interested in pursuing careers in and around the games industry and is also relevant for those interested in careers in experience and interaction design, human computer interaction, and related areas.

Code	Title		Credit Hours
GSAD Foundations			**(9)**
HIST 373	History of Video Games		3
HUM 371	Fundamentals of Game Design		3
HUM 372	Interactive Storytelling		3
Technical Proficiency			**(3)**
Select a minimum of one course. Additional courses recommended.			3
CS 331	Data Structures and Algorithms	3	
CS 411	Computer Graphics	3	
CS 425	Database Organization	3	
CS 442	Mobile Application Development	3	
CS 481	Intllgnc Txt Analys Knwldg Mgm	3	
Theoretical Proficiency			**(3)**
Select a minimum of one course from the following:			3
PSYC 312	Human Motivation and Emotion	3	
PSYC 423	Learning Theory	3	
PSYC 426	Cognitive Science	3	
Total Credit Hours			15

Minor in History

Required Courses

This minor consists of 15 credit hours of history coursework chosen in consultation with the minor adviser. Courses must be at or above the 300-level.

Minor in Information Architecture

Required Courses

The Information Architecture minor prepares students with a rich historical, theoretical, and practical foundation in technology and humanities for careers in web design/development, user experience and interface design, and other digital communications careers.

Code	Title		Credit Hours
COM 421	Technical Communication		3
or COM 428	Verbal Visual Communications		
Select a minimum of two courses from the following: [1]			6
COM 525	User Experience Research/Eval	3	
COM 528	Document Design	3	
COM 529	Technical Editing	3	
COM 380/580	Topics in Communication	3	
Select a minimum of two courses from the following: [1]			6
COM 541	Info Structure and Retrieval	3	
COM 542	Knowledge Management	3	
COM 543	Publication Management	3	
COM 380/580	Topics in Communication	3	
Total Credit Hours			15

1 Only one can be COM 380.

Minor in Linguistics

Required Courses

This minor consists of 15 credit hours of linguistics coursework chosen in consultation with the minor adviser. At least nine credit hours must be at or above the 300-level.

Code	Title		Credit Hours
Select a minimum of 15 credit hours from the following: [1]			15
COM 301	Intro Linguistics	3	
COM 306	World Englishes	3	
COM 308	Structure of Modern English	3	
COM 309	History English Language	3	
COM 310	The Human Voice	3	
COM 315	Discourse Analysis	3	
COM 435	Intercultural Communication	3	

1 Other courses such as COM 380 Topics in Communication may be used toward the minor, depending on the topic. Transfer coursework in foreign languages may also be considered toward credit for the minor.

Minor in Literature

Required Courses

This minor consists of 15 credit hours of literature courses at or above the 300-level.

Minor in Philosophy

Required Courses

This minor consists of 15 credit hours of philosophy courses at or above the 300-level.

Minor in Policy and Ethics

Required Courses

This minor consists of 15 credit hours.

Code	Title		Credit Hours
Select a minimum of one course from the following:			3
PHIL 301	Ancient Philosophy	3	
PHIL 302	Origins of Modern Philosophy	3	
PHIL 305	20th-Century Philosophy	3	
PHIL 311	Great Philosophers	3	
PHIL 332	Political Philosophy	3	
PHIL 333	Social Philosophy	3	
Select a minimum of one course from the following:			3
PHIL 351	Science and Values	3	
PHIL 370	Engineering Ethics	3	
PHIL 371	Ethics in Architecture	3	
PHIL 373	Business Ethics	3	
PHIL 374	Ethics in Computer Science	3	
or COM 377	Communication Law Ethics		
Select a minimum of one course from the following:			3
PS 306	Politics and Public Policy	3	
PS 313	Comparative Public Policy	3	
PS 408	Methods of Policy Analysis	3	
Select no more than two of the following:			6
PS 338	Energy Policy	3	
SSCI 354	Urban Policy	3	
SSCI 380	International Development	3	
Total Credit Hours			15

Appropriate substitutions may be made with the approval of the minor adviser.

Minor in Professional and Technical Communication

Required Courses

COM 421 and 12 credit hours of communication coursework chosen in consultation with the minor adviser.

Minor in Science and Technology Studies

Required Courses

This minor consists of 15 credit hours.

Code	Title		Credit Hours
HUM 380	Topics in Humanities		3
or PS 332	Politics of Sci and Technolgy		
Select three to six credit hours from the following:			3-6
COM 380	Topics in Communication	3	
PHIL 350	Science and Method	3	
SSCI 225	Geographic Information Systems	3	
SSCI 325	Intermediate Geo Info Systems	3	
Select six to nine credit hours from the following:			6-9
COM 334	Literature Modern Science	3	
COM 372	Mass Media Society	3	
COM 377	Communication Law Ethics	3	
HIST 372	History of Engineering	3	
HIST 375	History of Computing	3	
HIST 383	Tech History 1850 Present	3	
HUM 380	Topics in Humanities	3	
PHIL 341	Philosophy of Science	3	
PHIL 351	Science and Values	3	
PHIL 374	Ethics in Computer Science	3	
PS 332	Politics of Sci and Technolgy	3	
SOC 301	Social Dimension of Science	3	
SSCI 378	Innovation Policy	3	

Minor in Urban Studies

Required Courses

Code	Title		Credit Hours
Select a minimum of five courses from the following:			15
HIST 350	US Urban History	3	
HIST 351	The City in World History	3	
HIST 352	History of Chicago	3	
PS 315	Urban Politics	3	
or PS 317	Chicago Politics		
or SSCI 354	Urban Policy		
SOC 311	Social Use of Space	3	
SSCI 220	Global Chicago	3	
Total Credit Hours			15

Physics

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Chair
Grant Bunker

Associate Chair
Sally Laurent-Muehleisen

Faculty with Research Interests
For information regarding faculty visit the Department of Physics website.

The undergraduate physics programs at the Illinois Institute of Technology provide an excellent foundation for a number of professions including research, teaching, law (patent and intellectual property), health (radiation) physics, business, and technical management. Graduates are prepared for immediate entry into positions in industrial, government, and small business/venture research laboratories, and for graduate study in areas such as biophysics, condensed matter, high energy, accelerator, astrophysics, or computational physics. Many undergraduates go on to obtain graduate degrees, not only in physics, but in related natural sciences, engineering disciplines, health sciences, or computer science.

A student completing a Bachelor of Science (B.S.) degree in one of the physics programs will:

- Develop exceptional problem-solving ability
- Gain experience with experimental techniques, instrumentation, and measurement processes
- Develop mathematical, computational, and data analytical skills
- Gain a wide knowledge of fundamental physics as it applies both to the everyday world and to understanding nature’s secrets

Degree Programs

- Bachelor of Science in Applied Physics (p. 256)
- Bachelor of Science in Astrophysics (p. 261)
- Bachelor of Science in Physics (p. 264)

Co-Terminal Options

The Department of Physics also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Physics/Master of Science in Physics
- Bachelor of Science in Physics/Master of Health Physics
- Bachelor of Science in Physics/Master of Computer Science
- Bachelor of Science in Physics/Master of Science in Computer Science

These co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Physics website (science.iit.edu/physics).

Co-Terminal Bachelor of Science in Physics/Master of Health Physics Degree Program

Illinois Institute of Technology offers a five-year, co-terminal Bachelor of Science in Physics/Master of Health Physics degree program for students who wish to combine a Bachelor of Science in Physics degree with a professional-track Master of Health Physics degree leading to a career as a radiation health physicist. This program is designed for students seeking careers in government, industry, the military, and environmental and health-related fields where radiation protection and planning are critical.

The Nuclear Regulatory Commission, the Department of Energy, and the Health Physics Society (HPS) have all foreseen a significant need for new radiation health physicists. According to the HPS, “A projected shortfall in sufficiently educated radiation safety professionals has placed a burden on industries using radiation to support our nation's energy, security, and health needs." The current workforce in government and industry is aging and those positions need to be filled.

The unique opportunity to take classes online, as well as on campus, sets Illinois Institute of Technology apart from other health physics programs. Illinois Tech is one of only a handful of universities that offer this five-year, co-terminal opportunity and at Illinois Tech, faculty help students find an appropriate health physics internship.

Minors

- Minor in Astrophysics (p. 266)
- Minor in Physics (p. 266)

Bachelor of Science in Applied Physics

According to the *Princeton Review*: “With technology’s constantly expanding influence in our society, a major in applied physics could place you at the forefront of the next technology revolution.” Applied physics combines fundamental research in physics with knowledge of how to solve real-world problems, thus putting graduates of this major in high demand by employers. Through research in applied physics, lasers in DVD players, flash memories in iPods, diagnostic tools for medicine, and many other cutting edge technologies have been developed. With this degree, graduates will be prepared to immediately begin a career in a multitude of different areas or to enter into a graduate program in physics, engineering, or a non-physics related field. College Board sums up this degree in one word: flexibility.

The Bachelor of Science in Applied Physics degree provides an option for students who have a strong affinity for physics but who wish to pursue a career in application of basic scientific principles to the design of equipment, which includes electronic and electro-mechanical systems for use in measurements, communications, and data acquisition. The program is recommended for students interested in newly developing areas of physics, high technology, instrumentation, and communications. It provides students with a solid physics background while allowing for a significant engineering or other technical concentration.

Required Courses

Code	Title		Credit Hours
Physics Requirements			**(49)**
PHYS 100	Intro to the Profession		2
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
PHYS 223	General Physics III		4
PHYS 240	Computational Science		3
PHYS 300	Instrumentation Lab		4
PHYS 301	Math Methods of Physics		3
PHYS 304	Thermodynmics&Statistical Phys		3
PHYS 308	Classical Mechanics I		3
PHYS 309	Classical Mechanics II		3
PHYS 405	Fndmntls of Quantum Theory I		3
PHYS 406	Fndmntls of Quantum Theory II		3
PHYS 413	Electromagnetism I		3
PHYS 414	Electromagnetism II		3
PHYS 427	Advanced Physics Lab I		3
PHYS 485	Physics Colloquium		1
Specialization Requirements			**(27)**
Select 27 credit hours in a specific engineering, math, or science discipline [1]			27
Mathematics Requirements			**(18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 252	Introduction to Diff Equations		4
Technical Electives			**(6)**
Select six credit hours, approved by the advisor, from the physics, mathematics, computer science, or engineering departments			6
Chemistry Requirement			**(4)**
CHEM 124	Princ of Chemistry I with Lab		4
Computer Science Requirement			**(2)**
Select one of the following:			2
CS 104	Intro to Comp Prgrm for Engrs	2	
CS 105	Intro to Computer Programming	2	
CS 115	Object-Oriented Programming I	2	
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Humanities and Social Science Requirements			**(21)**

See Illinois Tech Core Curriculum, sections B and C (p. 24)	21
Total Credit Hours	133

[1] See the Specializations tab for a few recommended specializations.

Bachelor of Science in Applied Physics Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
PHYS 100	2	MS 201[1]	3
PHYS 123	4	PHYS 221	4
CHEM 124	4	MATH 152	5
MATH 151	5	Humanities 200-level Course	3
		Humanities or Social Sciences Elective	3
	15		18

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
PHYS 223	4	PHYS 240	3
MATH 251	4	PHYS 304	3
Specialization Course[2]	4	MATH 252	4
Social Sciences Elective	3	Specialization Course[2]	4
Computer Science Course[3]	2	Humanities Elective (300+)	3
	17		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
PHYS 300[4]	4	PHYS 309	3
PHYS 301	3	Technical Elective[5]	3
PHYS 308	3	IPRO Elective I	3
Specialization Course[2]	3	Specialization Course[2]	4
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
	16		16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
PHYS 405	3	PHYS 406	3
PHYS 413	3	PHYS 414	3
PHYS 427	3	PHYS 485	1
IPRO Elective II	3	Technical Elective[5]	3
Specialization Course[2]	3	Specialization Course[2]	3
Social Sciences Elective (300+)	3	Specialization Course[2]	3
	18		16

Total Credit Hours: 133

1. MS 201 is only required for the aerospace engineering and mechanical engineering specializations. For other specializations, students should choose one of the specialization course options.
2. A minimum of 27 credit hours are required in a specific engineering, math, or science discipline. See the Specializations tab for a few examples of engineering specializations. Courses should be chosen in consultation with an academic adviser.
3. Choose from: CS 104, CS 105, or CS 115 based on your specialization.
4. For students who choose the electrical engineering specialization, PHYS 300 is satisfied by ECE 211, ECE 213, and ECE 218.
5. See the Specializations tab for technical electives listed in some approved engineering specializations.

Engineering Specializations for Applied Physics

Courses should be chosen in consultation with an academic adviser. Approved specializations for the Bachelor of Science in Applied Physics degree include, but are not limited to, the following:

Aerospace Engineering

Code	Title		Credit Hours
Required course			**(27)**
MS 201	Materials Science		3
Students should take the following courses:			
MMAE 200	Statics		3
MMAE 202	Mechanics of Solids		3
MMAE 304	Mechanics of Aerostructures		3
MMAE 311	Compressible Flow		3
MMAE 312	Aerodynamics of Aerospace VHLS		3
MMAE 313	Fluid Mechanics		3
MMAE 320	Thermodynamics		3
MMAE 372	Aerospace Materials Lab		3
The three credit hours of technical electives may be chosen from the following:			
MMAE 352	Aerospace Propulsion	3	
MMAE 410	Aircraft Flight Mechanics	3	
MMAE 411	Spacecraft Dynamics	3	
MMAE 412	Spacecraft Design I	3	
MMAE 414	Aircraft Design I	3	
MMAE 443	Systems Analysis and Control	3	
Total Credit Hours			27

Electrical Engineering

Code	Title		Credit Hours
Students should take the following courses:			
ECE 211	Circuit Analysis I		3
ECE 213	Circuit Analysis II		4
ECE 218	Digital Systems		4
ECE 308	Signals Systems		3
ECE 311	Engineering Electronics		4
ECE 319	Fndmntls of Power Engrn		4
MATH 333	Matrix Alg & Complex Variables		3
The remaining six credit hours may be chosen from the following:			6
ECE 408	Intro to Computer Ntwks	3	
ECE 411	Power Electronics	4	
ECE 412	Hybrid Electric Vehicle Drives	4	
ECE 417	Power Dist Engring	3	
ECE 418	Power Systems Analysis	3	
ECE 429	Intro to VLSI Design	4	
ECE 436	Digital Signal Pcsgi w/Lab	3-4	
or ECE 437	Digital Signal Processing I		
ECE 438	Control Systems	3	
ECE 446	Advanced Logic Design	4	
Total Credit Hours			31

In addition, three credit hours of technical electives may be chosen from the ECE courses listed above if the required course, PHYS 300, is satisfied by ECE 211, ECE 213, and ECE 218.

Mechanical Engineering

Code	Title		Credit Hours
Required course			**(28)**
MS 201	Materials Science		3
Students should take the following courses:			
MMAE 202	Mechanics of Solids		3
MMAE 232	Design for Innovation		3
MMAE 302	Advanced Mechanics of Solids		3
MMAE 313	Fluid Mechanics		3
MMAE 319	Mechanical Laboratory I		4
MMAE 323	Heat and Mass Transfer		3
MMAE 332	Design of Machine Elements		3
The remaining three credit hours may be chosen from below. The applied physics technical elective may be chosen from below as well.			3
MMAE 419	Mechanical Laboratory II	4	
MMAE 432	Design of Mechanical Systems	3	
MMAE 440	Introduction to Robotics	3	
MMAE 443	Systems Analysis and Control	3	
MMAE 485	Manufacturing Processes	3	
Total Credit Hours			28

Bachelor of Science in Astrophysics

The astrophysics program emphasizes the physics celestial bodies including stars, galaxies, planetary systems, and cosmology as well as introducing students to best observational practices and the instrumentation used in modern astrophysics. Graduates continue on to obtain a Ph.D. or move on to jobs in government, military, universities, the private sector, or teaching positions in middle school and high school. The program is designed so that obtaining dual degrees in astrophysics and physics can be accomplished by most students in four years of study.

Required Courses

Code	Title	Credit Hours
Physics Requirements		**(40)**
PHYS 100	Intro to the Profession	2
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
PHYS 223	General Physics III	4
PHYS 240	Computational Science	3
PHYS 301	Math Methods of Physics	3
PHYS 304	Thermodynmics&Statistical Phys	3
PHYS 308	Classical Mechanics I	3
PHYS 309	Classical Mechanics II	3
PHYS 405	Fndmntls of Quantum Theory I	3
PHYS 413	Electromagnetism I	3
PHYS 427	Advanced Physics Lab I	3
PHYS 485	Physics Colloquium	1
PHYS 485	Physics Colloquium	1
Astronomy Requirements		**(16)**
PHYS 360	Introduction to Astrophysics	3
PHYS 361	Observational Astrophysics	4
PHYS 403	Relativity	3
PHYS 460	Stellar Astrophysics	3
PHYS 461	Extragalactic Astrophysics	3
Technical Elective Requirement		**(3)**
Select 3 credit hours [1]		3
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Chemistry Requirements		**(8)**
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(12)**
Select 12 credit hours		12
Total Credit Hours		126

[1] A technical elective is:

1. Any Physics course at or above the 300-level

OR

2. Any College of Science or College of Engineering course at or above the 300-level, chosen with approval of the student's advisor

Bachelor of Science in Astrophysics Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 100	2	PHYS 221	4
PHYS 123	4	MATH 152	5
MATH 151	5	CHEM 125	4
CHEM 124	4	Humanities or Social Sciences Elective	3
	15		16
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 223	4	PHYS 240	3
MATH 251	4	PHYS 304	3
CS 105	2	PHYS 360	3
Humanities 200-level Course	3	MATH 252	4
Social Sciences Elective	3	Humanities Elective (300+)	3
	16		16
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 301	3	PHYS 309	3
PHYS 308	3	PHYS 460[3]	3
PHYS 361[1]	4	Free Elective	3
PHYS 405[2]	3	IPRO Elective I	3
Social Sciences Elective (300+)	3	Social Sciences Elective (300+)	3
	16		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 413	3	PHYS 403[3]	3
PHYS 427	3	PHYS 485	1
PHYS 461[3]	3	Technical Elective[4]	3
PHYS 485	1	IPRO Elective II	3
Free Elective	3	Free Elective	3
Humanities Elective (300+)	3	Free Elective	3
	16		16

Total Credit Hours: 126

[1] PHYS 361 is offered every other fall semester.

[2] PHYS 405 can also be taken in the 7th semester with a free elective moved to the 5th semester.

[3] These three courses will be offered in a three-semester rotation and taken by 3rd and 4th year students together.

4 A technical elective is:
Any Physics course at or above the 300-level
OR
Any College of Science or College of Engineering course at or above the 300-level, chosen with approval of the student's advisor

Bachelor of Science in Physics

The undergraduate physics program provides an excellent preparation for graduate study in physics, as well as strong background for success in other professions, including law (patent and intellectual property), health physics, business, entrepreneurship, medicine, and research in other areas of science. The rigorous interdisciplinary nature of the program prepares graduates with an understanding of how physics is interrelated with biology, chemistry, computational sciences, and engineering. Graduates also are prepared for immediate entry into positions in industrial, medical, and other research laboratories, and for graduate study in areas such as biophysics, condensed matter physics, or high energy physics.

Required Courses

Code	Title	Credit Hours
Physics Requirements		**(53)**
PHYS 100	Intro to the Profession	2
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
PHYS 223	General Physics III	4
PHYS 240	Computational Science	3
PHYS 300	Instrumentation Lab	4
PHYS 301	Math Methods of Physics	3
PHYS 304	Thermodynmics&Statistical Phys	3
PHYS 308	Classical Mechanics I	3
PHYS 309	Classical Mechanics II	3
PHYS 405	Fndmntls of Quantum Theory I	3
PHYS 406	Fndmntls of Quantum Theory II	3
PHYS 413	Electromagnetism I	3
PHYS 414	Electromagnetism II	3
PHYS 427	Advanced Physics Lab I	3
PHYS 440	Computational Physics	3
PHYS 485	Physics Colloquium	1
PHYS 485	Physics Colloquium	1
Technical Elective Requirement		**(3)**
Select 3 credit hours [1]		3
Mathematics Requirements		**(18)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate & Vector Calculus	4
MATH 252	Introduction to Diff Equations	4
Mathematics Elective		**(3)**
Select three credit hours		3
Chemistry Requirements		**(8)**
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 115	Object-Oriented Programming I	
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Free Electives		**(12)**
Select 12 credit hours		12
Total Credit Hours		126

1 A technical elective is:

1. Any Physics course at or above the 300-level

OR

2. Any College of Science or College of Engineering course at or above the 300-level, chosen with approval of the student's advisor

Bachelor of Science in Physics Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 100	2	PHYS 221	4
PHYS 123	4	CHEM 125	4
CHEM 124	4	MATH 152	5
MATH 151	5	Humanities or Social Sciences Elective	3
	15		16
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 223	4	PHYS 240	3
MATH 251	4	PHYS 304	3
CS 105 or 115	2	MATH 252	4
Social Sciences Elective	3	Social Sciences Elective (300+)	3
Humanities 200-level Course	3	Social Sciences Elective (300+)	3
	16		16
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 300	4	PHYS 309	3
PHYS 301	3	PHYS 406	3
PHYS 308	3	Technical Elective[1]	3
PHYS 405	3	IPRO Elective I	3
Humanities Elective (300+)	3	Free Elective	3
	16		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PHYS 413	3	PHYS 414	3
PHYS 427	3	PHYS 440	3
PHYS 485	1	PHYS 485	1
IPRO Elective II	3	Math Elective, 300-level or above	3
Humanities Elective (300+)	3	Free Elective	3
Free Elective	3	Free Elective	3
	16		16

Total Credit Hours: 126

1 A technical elective is:

1. Any Physics course at or above the 300-level

OR

2. Any College of Science or College of Engineering course at or above the 300-level, chosen with approval of the student's advisor

Minor in Astrophysics

Required Courses

Code	Title		Credit Hours
PHYS 223	General Physics III		3-4
or PHYS 224	Gen Physics III for Engnrs		
PHYS 360	Introduction to Astrophysics		3
Select a minimum of three courses from the following:			9-10
PHYS 361	Observational Astrophysics [1]	4	
PHYS 403	Relativity [2]	3	
PHYS 460	Stellar Astrophysics [2]	3	
PHYS 461	Extragalactic Astrophysics [2]	3	
Total Credit Hours			15-17

1 PHYS 361 is offered every other fall semester.

2 PHYS 403, PHYS 460, and PHYS 461 are offered in a three-semester rotation and taken by 3rd and 4th year students together.

Minor in Physics

Required Courses

Code	Title	Credit Hours
PHYS 301	Math Methods of Physics	3
PHYS 304	Thermodynmics&Statistical Phys	3
PHYS 308	Classical Mechanics I	3
PHYS 405	Fndmntls of Quantum Theory I	3
PHYS 413	Electromagnetism I	3
Total Credit Hours		15

Psychology

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Chair
Frank Lane

Director of Undergraduate Programs
Arlen Moller

Faculty with Research Interests
For information regarding faculty visit the Department of Psychology website.

The Department of Psychology offers a Bachelor of Science (B.S.) degree in Psychological Science, Applied Analytics, Behavioral Health and Wellness, and Consumer Research, Analytics, and Communications.

Designed for highly motivated, career-oriented students, the degree programs offered by the Department of Psychology emphasize the integration of applied research with faculty, practical experience in professional settings, and traditional classroom activities. The programs are characterized by faculty mentorship, individual advising, and group activities with faculty, graduate students, and other undergraduate students.

The B.S. in Psychological Science offers a distinctive research-based, human-behavior-oriented undergraduate education with an emphasis on applications of psychology. Students benefit from the strengths of faculty in the highly successful graduate programs in clinical psychology, industrial-organizational psychology, and rehabilitation and mental health counseling.

Interdisciplinary degrees provide career-focused training that spans academic departments. These degrees combine coursework and hands-on experience in the multiple fields, including psychology, political science, sociology, communication, and business. Interdisciplinary training prepares students to succeed in the modern workplace, which increasingly relies on cross-functional teams with diverse expertise.

The B.S. in Behavioral Health and Wellness provides students with a broad understanding of how lifestyle choices impact health, and how health professionals design programs to promote healthy lifestyle choices. The degree prepares graduates for a wide range of health/wellness professions in private business and industry, community organizations, and healthcare environments.

The B.S. in Consumer Research, Analytics, and Communication trains students as integrated social/behavioral scientists who can apply the theory, research, and tools of the social and behavioral sciences to practical problems of government policy and business strategy and can work with decision-makers in both cultures.

The Department of Psychology also offers accelerated programs that combine undergraduate and graduate professional education. The degrees offered by the department may be used as the basis for the combined undergraduate-graduate professional degree programs in law (B.S./J.D.).

Scholarship Opportunities

Psychology students have access to a wide range of scholarships. One program—the David J. Vitale Scholarship—is earmarked only for undergraduate psychology students.

Recipients typically receive $2,000–$5,000 per year. This award is only applicable to a student's first four years of study at the university.

Degree Programs

Minors

Minors consist of at least five courses (minimum 15 credit hours) and are optional and frequently cross-disciplinary. Since they provide a coherent set of ideas, concepts, and educational experiences in a variety of areas, students may find that they enhance potential for professional development. Students who wish to pursue a minor must consult with advisers in their respective major departments.

The Department of Psychology offers minors in Human Resources, Leadership, Psychology, and Rehabilitation Services. Students pursuing a degree in psychology can minor in Rehabilitation Services.

- Minor in Human Resources (p. 292)
- Minor in Leadership (p. 292)
- Minor in Psychology (p. 293)
- Minor in Rehabilitation Services (p. 293)

Optional Programs

Advanced Standing Programs

The Department of Psychology offers combined and graduate advanced standing programs. These flexible programs give students solid professional credentials in more than one field, improving their marketability and expanding their career options.

A specialization in psychology may be used as the basis for the combined undergraduate-graduate professional degree programs in law (B.S./J.D.). Students earning a B.S. in Psychological Science degree can apply for advanced standing in the M.S. in Rehabilitation and Mental Health Counseling program.

For undergraduate psychology majors, it is possible to earn a Master of Science in Rehabilitation and Mental Health Counseling with Advanced Standing in one-and a-half years instead of the normal two years. By taking psychology courses that apply to the rehabilitation and mental health counseling program, graduate program coursework can be reduced by up to 15 credit hours, or one full-time semester.

Students wishing to participate in these options must indicate this as early as possible. With the consent of the Department of Psychology chair, undergraduate psychology students may enroll in some graduate-level psychology courses. Close communication with advisers is required for students to reach their target completion dates for accelerated programs. Students must also meet the minimum graduate program admission criteria, apply, and be accepted into the graduate program they wish to enter.

M.S. Rehabilitation and Mental Health Counseling with Advanced Standing

The mission of the Counseling and Rehabilitation Sciences Division is to prepare students to assume vital roles as counselors fully qualified to help in the clinical mental health, rehabilitation, vocational, educational, and personal adjustment of people with disabilities, chronic illnesses, and/or mental and emotional issues.

The rehabilitation and mental health counseling education program, fully accredited in Clinical Mental Health and Clinical Rehabilitation Counseling by the Council for Accreditation of Counseling and Related Educational Programs (CACREP), is designed to prepare students to function as rehabilitation and/or clinical mental health counselors for persons with a variety of needs including mental health issues impacting the individual and/or family, and persons with physical or mental disabilities who need psychosocial and vocational readjustment. The program is grounded in a strengths-based philosophy of client empowerment where the counselor's role is to assist individuals to realize their optimum level of mental health and personal wellness, including vocational adjustment and independent living. This is done through the use of a variety of therapeutic interventions, including individual, group and/or family counseling, diagnosis, case management, the provision or coordination of evaluation, physical restoration, training, placement, and follow-up services. The demand for rehabilitation and clinical mental health counselors has exceeded the supply in recent years, in public, private, nonprofit, and for-profit sectors.

Rehabilitation and Mental Health Counseling Courses

Undergraduate students who complete the equivalent of the first semester's required courses may qualify for admission with advanced standing to the Master of Science in Rehabilitation and Mental Health Counseling. Admission with advanced standing may allow the student to count up to 15 graduate credit hours taken while an undergraduate toward the M.S. degree, and allow the candidate to complete the Master of Rehabilitation and Mental Health Counseling degree in one-and-a-half years (three semesters). The regular master's program in rehabilitation and mental health counseling requires 60 credit hours post bachelor's degree usually completed over the course of two years. However, undergraduate students who meet the criteria for regular admission to the master's program can consider completing their master's degree more quickly by effective use of their electives. In their junior and senior years, qualified students begin taking graduate courses after admission into the program.

Students in the accelerated program may take the following courses as part of required or elective courses for the B.S. in Psychological Science. If taken as an undergraduate student, the courses listed below do not have to be repeated for the Master of Science in Rehabilitation and Mental Health Counseling. A grade of "B" or better is required for courses to be used toward a graduate degree.

PSYC 410	Introduction to Rehabilitation and Mental Health Counseling	3
PSYC 411	Medical Aspects of Disabling Conditions	3

PSYC 412	Multicultural and Psychosocial Issues in Rehabilitation and Mental Health Counseling	3
PSYC 513	Assessment in Rehabilitation and Mental Health Counseling	3
PSYC 523	Theories of Psychotherapy	3
PSYC 562	Job Placement	3
PSYC 563	Human Growth and Career Development	3
PSYC 583	Rehabilitation Engineering Technology I: Survey of Interdisciplinary Application of RET	3
PSYC 590	Psychiatric Rehabilitation	3

Illinois Institute of Technology/College of DuPage Dual Admission 2+2 Program

Students who meet the requirements of the Dual Admission Program (DAP) may enroll simultaneously at the College of DuPage (COD) and Illinois Institute of Technology. Students accepted into the DAP will have access to advising and other services from both institutions. Students who successfully complete the institutional course requirements of both institutions under the DAP will be awarded an associate's degree from COD and a Bachelor of Science in Psychological Science degree from Illinois Tech.

Eligibility for the Program

Students applying to the program must have a cumulative GPA of at least 3.00 either in high school or at COD to be eligible for admission to the DAP. Students must make satisfactory academic progress at COD, as defined by COD and Illinois Tech, to remain in the program.

Application Process

Applicants must complete a Statement of Intent Form which permits the exchange of academic, admission, and advising information between Illinois Tech and COD. Applicants must also complete the application process at both COD and Illinois Tech in order to be admitted to both institutions. The Illinois Tech application may be submitted only for a B.S. in Psychological Science degree. Admission to other Illinois Tech programs may have additional requirements that are outside the scope of this program.

Academic Program Requirements

Students must follow each institution's policies regarding admission, course enrollment, transfer hours, probation, dismissal, and reinstatement. Transcripts must be sent to the Illinois Tech Office of Undergraduate Academic Affairs each semester for each student attending COD and enrolled in the DAP. Illinois Tech will provide COD with major and course updates, course prerequisites, and program requirements for the psychology program.

Graduation Requirements

Students enrolled in the DAP must follow the COD catalog to satisfy requirements for the associate's degree and the requirements set out in the Illinois Tech Undergraduate Bulletin in effect at the time of admission into the DAP for the bachelor's degree.

Certificate in Industrial Training

This certificate is designed to help individuals learn methods of knowledge delivery in industrial training settings. **This certificate is only available to students enrolled in a degree program at the university and does not qualify for federal financial aid.**

Program of Study

The American Society of Training and Development has a certificate with topics and courses similar to this certificate program. We ensure that our students will receive training on par with ASTD specifications. An introductory psychology course or basic knowledge of the field is recommended for this program.

Code	Title		Credit Hours
PSYC 301	Industrial Psychology		3
PSYC 423	Learning Theory		3
PSYC 455	Dev and Eval of Traing Orgs		3
Select one of the following: [1]			3
PSYC 312	Human Motivation and Emotion	3	
PSYC 380	Topics in Psychology [2]	3	
PSYC 381	Topics in Psychology [2]	3	
PSYC 409	Psychological Testing	3	
PSYC 426	Cognitive Science	3	
PSYC 481	Group&Leadership at Work	3	
PSYC 489	Undergrad PSYCY Seminar	3	

1 These courses cannot be counted toward the certificate if they are a required course for a degree program.

2 Topic must be approved by the adviser.

Bachelor of Science in Applied Analytics

Applied Analytics

The Bachelor of Science in Applied Analytics combines training in using quantitative research methods and communicating their results. Students pursuing a Bachelor of Science in Applied Analytics will develop an understanding of:

- How to collect, curate, and analyze data
- How to communicate the implications of data to various audiences and applications
- How to apply the aforementioned skills with respect to the social sciences, psychology, or business

Students majoring in applied analytics must complete core courses in statistics and theory, computer science, and communication. Through free electives and proper advising, students will be able to tailor their focus around topics including but not limited to advanced statistics, data mining, information management systems, geographic information systems, online social networks, and psychological testing. The required capstone project will be based on these core courses and electives, highlighting students' skills as well as their personal interests.

Successful completion of the applied analytics degree ensures students will be able to manage and analyze data using an array of statistical approaches. They will be well prepared for the workplace and/or advanced research in statistics or fields in which knowledge of statistics is required, particularly careers in data science, market analysis, business analysis, bioinformatics, psychometrics, and public relations. Our career advising is based on the close monitoring of the types of analytics needed today and in the future.

Required Courses

Code	Title		Credit Hours
Introduction to Profession			**(2-3)**
Select one of the following:			2-3
BUS 100	Introduction to Business	3	
LCHS 100	Intro to the Professions	2	
PSYC 100	Intro to Profession	3	
SSCI 100	Introduction to the Profession	3	
Theory and Data (TD) Requirements			**(7)**
MATH 251	Multivariate & Vector Calculus		4
MATH 474	Probability and Statistics		3
Specialization Requirements			**(12-14)**
Students must complete 12 credit hours in a specialization track. Select four courses in one of the specialization tracks below:			12-14
Business/Economics specialization courses			
BUS 221	Business Statistics	3	
ECON 151	Microeconomics	3	
ECON 152	Global Economics	3	
ECON 423	Econ Anal Capital Investments	3	
Psychology specialization courses			
PSYC 203	Undergrad Stats Bhvrl Sci	4	
PSYC 204	Rsrch Method in Behavioral Sci	4	
PSYC 221	Intro to Psychological Science	3	
PSYC 320	Applied Correlation/Regression	3	
Social Sciences/Humanities specialization courses			
COM 383	Social Networks	3	
PSYC 203	Undergrad Stats Bhvrl Sci	3-4	
or BUS 221	Business Statistics		
SSCI 209	Social Science Research Method	3	
SSCI 225	Geographic Information Systems	3	
COM 381	Topics in Communication [1]	3	
or PS 385	Topics in Political Science		
or SOC 385	Topics in Sociology		
or SSCI 385	Special Topics		
Data Structures and Management (DSM) Requirements			**(9)**

Choose a minimum of three courses from the following:			9
CS 331	Data Structures and Algorithms	3	
CS 422	Data Mining	3	
ITMD 421		3	
ITMD 422	Advanced Database Mgmt	3	
ITMS 428	Database Security	3	
Communicating About Data (CAD) Requirements			**(12)**
Select a minimum of four courses from the following:			12
COM 421	Technical Communication	3	
COM 424	Document Design	3	
COM 428	Verbal Visual Communications	3	
EG 425	Cmptr Gphs for Non Engrs	3	
ITM 300	Commctn in the Wrkpl	3	
ITM 301	Intro OS and Hardware I	3	
ITMD 361	Fund of Web Development	3	
ITMD 362	Human-Computer Interaction	3	
ITMD 460	Fundamentals of Multimedia	3	
PHIL 351	Science and Values	3	
PHIL 374	Ethics in Computer Science	3	
Capstone Project			**(3)**
Topic must be approved by the adviser.			3
Mathematics Requirements			**(10)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
Computer Science Requirements			**(4-6)**
Select one of the following:			4-6
CS 115 & CS 116	Object-Oriented Programming I and Object-Oriented Programming II	4	
CS 105 & CS 201	Intro to Computer Programming and Accelerated Intro to Cmptr Sci	6	
Natural Sciences Requirements			**(11-12)**
See Illinois Tech Core Curriculum, section D (p. 25)			11-12
Interprofessional Projects (IPRO)			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Humanities and Social Sciences Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Free Electives			**(30)**
Select 30 credit hours			30

Minimum degree credits required: 127/128

1 Topic must be approved by the adviser.

Bachelor of Science in Applied Analytics Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
Introduction to the Profession[1]	2-3	MATH 152	5
Science Elective	3	CS 116[2]	2
Science Lab Elective	1	Science Elective	3
CS 115[2]	2	Social Sciences Elective	3
MATH 151	5	Humanities 200-level Course	3
Free Elective	3		
	16-17		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 251	4	Specialization Course[3]	3
Science Elective	4	Data Structures and Management Elective[4]	3
Specialization Course[3]	3	Communicating about Data Elective[5]	3
Social Sciences Elective (300+)	3	Humanities or Social Sciences Elective	3
Free Elective	3	Free Elective	3
		Free Elective	3
	17		18

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 474	3	Specialization Course[3]	3
Data Structures and Management Elective[4]	3	Data Structures and Management Elective[4]	3
Communicating about Data Elective[5]	3	IPRO Elective II	3
IPRO Elective I	3	Humanities Elective (300+)	3
Free Elective	3	Free Elective	3
	15		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
Specialization Course[3]	3	Capstone Project[6]	3
Communicating about Data Elective[5]	3	Communicating about Data Elective[5]	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Total Credit Hours: 127-128

1. Choose from the following courses: BUS 100, LCHS 100, PSYC 100, or SSCI 100.
2. The CS 115 and CS 116 sequence may be substituted by the CS 105 and CS 201 sequence.
3. See specialization course options on the Program Requirements tab.
4. Choose from the following courses: CS 331, CS 422, ITMD 421, ITMD 422, or ITMS 428.
5. Choose from the following courses: COM 421, COM 424, COM 428, EG 425, ITM 300, ITM 301, ITMD 415, PHIL 351, or PHIL 374.
6. Topic must be approved by adviser.

Bachelor of Science in Behavioral Health and Wellness

Behavioral Health and Wellness

The behavioral health and wellness degree program will provide students with a broad understanding of how lifestyle choices impact health, and how health professionals design programs to promote healthy lifestyle choices. Students will develop an understanding of three core areas:

1. Intervention development and implementation
2. Community care coordination
3. Public health policy

Promoting skills in these interrelated areas will prepare graduates for a wide range of health/wellness professions in private business and industry, community organizations, and healthcare environments.

The behavioral health and wellness degree is designed as an interdisciplinary program, combining coursework in psychology, sociology, political science, and nutritional science to address health promotion at the individual, institutional, and societal levels. The curriculum of the behavioral health and wellness major will provide students with a broad understanding of the psychological, social, and cultural context of health behavior, including related theories, skills, and emerging technology.

A flexible curriculum allows the degree to be customized around student interest and career goals. Students can choose to specialize in health psychology, public health, or nutrition. The degree program will include a capstone project designed to integrate and apply the concepts and skills learned throughout the curriculum. The capstone will be an individually tailored project defined in collaboration with a faculty adviser which will typically involve a field placement and may include a research component.

Students completing the behavioral health and wellness degree will be able to:

- Demonstrate knowledge of principles of designing and implementing behavior change programs for a variety of health related behaviors; cultural and community-specific tailoring of behavioral health interventions; and fundamentals of public health policy analysis and advocacy.
- Effectively communicate health-promotion information to both professional and lay audiences.
- Gather and analyze information regarding individual and community health needs, and to use this information to guide program development.

Required Courses

Code	Title		Credit Hours
Behavioral Health and Wellness Requirements			**(27-28)**
Select one of the following:			2-3
PSYC 100	Intro to Profession	3	
LCHS 100	Intro to the Professions	2	
SSCI 100	Introduction to the Profession	3	
PSYC 221	Intro to Psychological Science		3
PSYC 330	Health Psychology		3
PSYC 204	Rsrch Method in Behavioral Sci		4
PSYC 310	Social Psychology		3
or SOC 208	Social Psychology and Society		
PSYC 409	Psychological Testing		3
or SSCI 480	Intro to Survey Methodology		
SOC 200	Introduction to Sociology		3
SSCI 321	Social Inequality		3
Select one of the following:			3
COM 421	Technical Communication	3	
COM 428	Verbal Visual Communications	3	
COM 435	Intercultural Communication	3	
Behavioral Health and Wellness Electives			**(30)**
Complete an area of specialization (15 credit hours), three credit hours from each of the remaining specializations and nine credit hours of Behavioral Health & Wellness electives [1,2]			30

Mathematics Requirements		**(7)**
PSYC 203	Undergrad Stats Bhvrl Sci	4
Mathematics Elective [3]		3
Capstone Project		**(3)**
Select three credit hours		3
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Natural Sciences Requirements		**(10-11)**
See Illinois Tech Core Curriculum, section D (p. 25)		10-11
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Sciences Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Free Electives		**(15-18)**
Select 15-18 credit hours [2]		15-18

Minimum degree credits required: 126

1. Specializations in Health Psychology, Public Health, or Nutrition require 15 credit hours in the area of specialization and at least three credit hours from each of the other two specializations. The remaining nine credit hours may be taken from any of the three specializations or from the list of other Behavioral Health and Wellness electives. Please see the Specializations tab on this page.
2. A maximum of three credit hours of PSYC 497 can be earned in any given semester. A maximum of six credit hours of PSYC 497 can be applied as behavioral health and wellness electives. Additional PSYC 497 credit hours may be applied as free electives.
3. At the level of MATH 122 or above.

Bachelor of Science in Behavioral Health and Wellness Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
PSYC 100[1]	3	SOC 200	3
PSYC 221	3	SSCI 321	3
Science Elective[2]	3	Science Elective[2]	3
Science Lab Elective[2]	1	Science Lab Elective[2]	1
Mathematics Elective[3]	3	Mathematics Elective[3]	3
Humanities 200-level Course	3	Social Sciences Elective	3
	16		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
PSYC 203	4	PSYC 204	4
PSYC 310 or SOC 208	3	PSYC 330	3
Science Elective[2]	3	Specialization Elective[4]	3
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
Social Sciences Elective (300+)	3	Social Sciences Elective (300+)	3
	16		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
PSYC 409 or SSCI 480	3	Specialization Elective[4]	3
CS 105 or 110	2	Behavioral Health and Wellness Elective[4]	3
Specialization Elective[4]	3	Behavioral Health and Wellness Elective[4]	3
Behavioral Health and Wellness Elective[4]	3	IPRO Elective	3
Free Elective	3	Humanities Elective (300+)	3
Free Elective	3		
	17		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
COM 421[5]	3	PSYC 485[6]	3
Behavioral Health and Wellness Elective[4]	3	Behavioral Health and Wellness Elective[4]	3
Specialization Elective[4]	3	Specialization Elective[4]	3
IPRO Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Total Credit Hours: 126

1. Select from the following courses: PSYC 100, LCHS 100, or SSCI 100.
2. At least one biology course is required. Recommended courses are BIOL 105, BIOL 114, BIOL 117, and (PHYS 200 or CHEM 124).
3. Mathematics elective requirement is satisfied by at least four credit hours at the level of MATH 119 or above.
4. See Specializations tab for Behavioral Health and Wellness specializations and Behavioral Health and Wellness electives.
5. Students may substitute COM 428 or COM 435.
6. Topic must be approved by the adviser.

Behavioral Health and Wellness Specializations

Students must complete 15 credit hours from one area of specialization (Health Psychology, Public Health, or Nutrition) and at least three credit hours from each of the other two specializations. The remaining nine credit hours may be taken from any of the three specializations or from the following list of other Behavioral Health and Wellness electives.

Health Psychology

A minimum of 15 credit hours is required for this specialization.

Code	Title	Credit Hours
PSYC 303	Intro to Psychopathology	3
PSYC 312	Human Motivation and Emotion	3
PSYC 360	Clinical Psy: Assess/Treatment	3
PSYC 370	Health and Safety at Work	3
PSYC 380	Topics in Psychology [1]	3
PSYC 381	Topics in Psychology [1]	3
PSYC 414	Neural & Biol Bases Behavior	3
PSYC 435	Child Development	3
PSYC 436	Adult Development	3
PSYC 460	Child and Adolescent Disorders	3
PSYC 465	Behavior Change Principle/Prac	3

1 Seminar and Topics courses may be used as electives if the topic is relevant to behavioral health and wellness. These courses may be taken more than once to total the 15 credit hours required for the Public Health specialization, if different topics are offered. Adviser approval required.

Nutrition

A minimum of 15 credit hours is required for this specialization.

Code	Title	Credit Hours
FDSN 201	Nutrition and Wellness	3
FDSN 300	Nutrition Thru the Life Cycle	3
FDSN 301	Exploring Food Science & Tech	3
FDSN 401	Nutrition, Metabolism & Health	3
FDSN 405	Food and Behavior	3

Public Health

A minimum of 15 credit hours is required for this specialization.

Code	Title	Credit Hours
PSYC 350	Prejudice and Stigma	3
SOC 385	Topics in Sociology	3
SSCI 225	Geographic Information Systems	3
SSCI 318	Global Health	3
SSCI 319	Comparative Health Systems	3
SSCI 325	Intermediate Geo Info Systems	3
SSCI 385	Special Topics [1]	3
SSCI 486	Planning, Fundraising, & Eval	3

1 Seminar and Topics courses may be used as electives if the topic is relevant to behavioral health and wellness. These courses may be taken more than once to total the 15 credit hours required for the Public Health specialization, if different topics are offered. Adviser approval required.

Other Behavioral Health and Wellness Electives

Code	Title	Credit Hours
BIOL 305	Human Anatomy	3
BIOL 430	Human Physiology	3
PSYC 301	Industrial Psychology	3
PSYC 320	Applied Correlation/Regression	3
PSYC 370	Health and Safety at Work	3
PSYC 410	Intro Rehab/Mental Health Cslg	3
PSYC 411	Medcl Aspects of Dsblng Cond	3
PSYC 412	Multicultural/Psychosocial Iss	3
PSYC 423	Learning Theory	3
PSYC 455	Dev and Eval of Traing Orgs	3

Bachelor of Science in Psychological Science

Psychological Science

Psychology is the scientific study of behavior—how individuals think, feel, and behave. Graduates will have a strong background in scientific thinking and be able to apply psychological research and principles to the study of contemporary problems in a variety of fields.

Students in the psychological science program will develop an understanding of:

- How people perceive and process information and how they use that information to make decisions
- Psychological theories in a variety of fields including social, cognitive, clinical, industrial-organizational, development, and neuroscience
- How to apply psychological theories to real-world problems
- How to design research studies, analyze results, and communicate results to a variety of communities

A flexible curriculum allows the degree to be customized. Students can elect to specialize in clinical/behavioral health, culture and diversity, industrial/organizational, and rehabilitation services. Students will work with a faculty mentor to craft a program of study that supports their interests and career goals. Options for pre-medicine and honors law are available.

All students complete a capstone project designed to integrate and apply the concepts and skills learned throughout the curriculum. The capstone will be an individually tailored project defined in collaboration with a faculty adviser which will typically involve either a field placement or research component.

The psychological science degree will prepare graduates for a wide range of professions in business and industry, community organizations, and health services. The program will also prepare graduates to be competitive for a wide range of graduate training programs in psychology at the masters and doctoral levels. In addition, many students will find psychological science highly beneficial as a pre-professional major for advanced studies in medicine, dentistry, law, business, or public administration.

Required Courses

Code	Title		Credit Hours
Psychological Science Requirements			**(27-28)**
PSYC 100	Intro to Profession		2-3
or LCHS 100	Intro to the Professions		
PSYC 204	Rsrch Method in Behavioral Sci		4
PSYC 221	Intro to Psychological Science		3
PSYC 301	Industrial Psychology		3
or PSYC 303	Intro to Psychopathology		
PSYC 310	Social Psychology		3
PSYC 320	Applied Correlation/Regression		3
or PSYC 409	Psychological Testing		
PSYC 414	Neural & Biol Bases Behavior		3
PSYC 435	Child Development		3
or PSYC 436	Adult Development		
Choose one course from the following:			3
PSYC 312	Human Motivation and Emotion	3	
PSYC 423	Learning Theory	3	
PSYC 426	Cognitive Science	3	
Psychology Electives			**(15)**
Choose 15 credit hours of psychology courses at 300- or 400-level [1,2]			15
Psychology Capstone Project			**(3)**
PSYC 485	Senior Capstone Project I		3
Mathematics Requirements			**(7)**
At least three credit hours of MATH 122 or above			3
PSYC 203	Undergrad Stats Bhvrl Sci		4
Computer Science Requirement			**(2)**
CS 105	Intro to Computer Programming		2
or CS 110	Computing Principles		

Natural Sciences Requirements	**(10-11)**
See Illinois Tech Core Curriculum, section D (p. 25)	10-11
Humanities and Social Sciences Requirements	**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)	21
Interprofessional Projects (IPRO)	**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)	6
Free Electives	**(33-35)**
Select 33-35 credit hours [2]	33-35

Minimum degree credits required: 126

1 15 credit hours of psychology electives are required (chosen from any psychology course at the 300- or 400-level that is not part of the required core courses), or 15 credit hours in a specialization. Note that courses taken in the required core psychological science curriculum cannot be counted towards specialization requirements. Only six credit hours in a specialization may be taken in a field outside of psychology.

2 A maximum of three credit hours of PSYC 497 can be earned in any given semester. A maximum of six credit hours of PSYC 497 can be applied as psychology electives. Additional PSYC 497 credit hours may be applied as free electives.

Bachelor of Science in Psychological Science Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
PSYC 100 or LCHS 100	3	PSYC 301 or 303	3
PSYC 221	3	Science Elective	3
Humanities 200-level Course	3	Science Lab Elective	1
Science Elective	3	Social Sciences Elective	3
Science Lab Elective	1	Humanities or Social Sciences Elective	3
Mathematics Elective[1]	3	Free Elective	3
	16		16

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
PSYC 203	4	PSYC 204	4
PSYC 310	3	Social Sciences Elective (300+)	3
Science Elective	3	Social Sciences Elective (300+)	3
Humanities Elective (300+)	3	Free Elective	3
Humanities Elective (300+)	3	Free Elective	3
	16		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
PSYC 320 or 409	3	PSYC 435 or 436	3
PSYC 414	3	Psychology Elective[2]	3
Psychology Elective[2]	3	CS 105 or 110	2
Free Elective	3	IPRO Elective I	3
Free Elective	3	Free Elective	3
		Free Elective	3
	15		17

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
PSYC 312, 423, or 426	3	Psychology Elective[2]	3
PSYC 485[3]	3	Psychology Elective[2]	3
Psychology Elective[2]	3	IPRO Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Total Credit Hours: 126

1 At least three credit hours of MATH 122 or above.

2 15 credit hours of psychology electives are required (chosen from any psychology course at the 300- or 400-level that is not part of the required core courses), or 15 credit hours in a specialization. Note that courses taken in the required core psychological science curriculum cannot be counted towards specialization requirements. Only six credit hours in a specialization may be taken in a field outside of psychology.

3 Capstone project must be approved by adviser.

Psychological Science Specializations

Clinical/Behavioral Health Psychology

A minimum of 15 credit hours is required for this specialization. Note that courses taken in the required core psychological science curriculum cannot be counted towards specialization requirements. Only six credit hours in a specialization may be taken in a field outside of psychology.

Code	Title		Credit Hours
PSYC 303	Intro to Psychopathology		3
PSYC 330	Health Psychology		3
Select three courses from the following:			9
PSYC 360	Clinical Psy: Assess/Treatment	3	
PSYC 435	Child Development	3	
PSYC 436	Adult Development	3	
PSYC 460	Child and Adolescent Disorders	3	
PSYC 465	Behavior Change Principle/Prac	3	

Culture and Diversity

A minimum of 15 credit hours is required for this specialization. Note that courses taken in the required core psychological science curriculum cannot be counted towards specialization requirements. Only six credit hours in a specialization may be taken in a field outside of psychology.

Code	Title		Credit Hours
Select five courses from the following:			15
PSYC 350	Prejudice and Stigma	3	
PSYC 355	Cross-Cultural Psychology	3	
PSYC 411	Medcl Aspects of Dsblng Cond	3	
PSYC 412	Multicultural/Psychosocial Iss	3	
SSCI 220	Global Chicago	3	
SSCI 321	Social Inequality	3	
SSCI 323	Problems of Multi-Ethnic/Relig	3	

Industrial/Organizational Psychology

A minimum of 15 credit hours is required for this specialization. Note that courses taken in the required core psychological science curriculum cannot be counted towards specialization requirements. Only six credit hours in a specialization may be taken in a field outside of psychology.

Code	Title		Credit Hours
PSYC 301	Industrial Psychology		3
Select four courses from the following:			12
PSYC 320	Applied Correlation/Regression	3	
PSYC 355	Cross-Cultural Psychology	3	
PSYC 409	Psychological Testing	3	
PSYC 455	Dev and Eval of Traing Orgs	3	
PSYC 481	Group&Leadership at Work	3	

Rehabilitation

A minimum of 15 credit hours is required for this specialization. Note that courses taken in the required core psychological science curriculum cannot be counted towards specialization requirements. Only six credit hours in a specialization may be taken in a field outside of psychology.

Code	Title	Credit Hours
PSYC 410	Intro Rehab/Mental Health Cslg	3
PSYC 411	Medcl Aspects of Dsblng Cond	3
PSYC 412	Multicultural/Psychosocial Iss	3
PSYC 583	Rehab Engineering Technology I	3
PSYC 590	Psychiatric Rehabilitation	3

Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science

Required Courses

Code	Title		Credit Hours
Biology Requirements			**(29)**
BIOL 107	General Biol Lecture		3
BIOL 109	General Biology Lab		1
BIOL 115	Human Biology		3
BIOL 117	Human Biology Lab		1
BIOL 210	Microbiology		3
BIOL 214	Genetics		3
BIOL 401	Introductory Biochemistry		3
BIOL 402	Metabolic Biochemistry		3
BIOL 404	Biochemistry Laboratory		3
BIOL 445	Cell Biology		3
BIOL 451	Biological Literature		2
BIOL 495	Biology Colloquium		1
or CHEM 485	Chemistry Colloquium		
Dual Degree Elective			**(3)**
Select three credit hours from the following:			3
BIOL 420	Population Genetics	3	
BIOL 430	Human Physiology	3	
BIOL 475	Health/Disease in Mod Society	3	
FDSN 401	Nutrition, Metabolism & Health	3	
Biochemistry Elective			**(2-3)**
Select two to three credit hours			2-3
Chemistry Requirements			**(26)**
CHEM 124	Princ of Chemistry I with Lab		4
CHEM 125	Prin of Chemistry II w/Lab		4
CHEM 237	Organic Chemistry I		4
CHEM 239	Organic Chemistry II		3
CHEM 240	Organic Chemistry Lab		2
CHEM 247	Analytical Chemistry		3
CHEM 343	Physical Chemistry I		3
CHEM 438	Physical Biochemistry		3
or CHEM 344	Physical Chemistry II		
Physics Requirements			**(8)**
PHYS 123	General Physics I: Mechanics		4
PHYS 221	Gen Physics II: Elect&Magntism		4
Mathematics Requirements			**(17-18)**
MATH 151	Calculus I		5
MATH 152	Calculus II		5
MATH 251	Multivariate & Vector Calculus		4
MATH 425	Statistical Methods		3-4
or PSYC 203	Undergrad Stats Bhvrl Sci		
Psychological Science Requirements			**(28)**
PSYC 204	Rsrch Method in Behavioral Sci		4
PSYC 221	Intro to Psychological Science		3
PSYC 301	Industrial Psychology		3
or PSYC 303	Intro to Psychopathology		

PSYC 310	Social Psychology	3
PSYC 312	Human Motivation and Emotion	3
or PSYC 423	Learning Theory	
or PSYC 426	Cognitive Science	
PSYC 320	Applied Correlation/Regression	3
or PSYC 409	Psychological Testing	
PSYC 414	Neural & Biol Bases Behavior	3
PSYC 435	Child Development	3
or PSYC 436	Adult Development	
PSYC 485	Senior Capstone Project I	3
Psychological Science Electives		**(9)**
Select nine credit hours [1]		9
Introduction to the Profession		**(2-3)**
BIOL 100	Intro to Profession	2-3
or PSYC 100	Intro to Profession	
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Sciences Requirements		**(12-21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24) [1]		12-21

Minimum degree credits required: 144

1 B.S. Biochemistry/B.S. Psychological Science students may apply a maximum of three psychology courses to both the social sciences requirements and the psychology electives specified for the psychological science degree requirements (psychology electives must be 300-level and above). At least one of the social science "S" courses must be a non-psychology course.

Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science Curriculum - Eight Semester Plan

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
BIOL 109	1	CHEM 125	4
CHEM 124	4	PHYS 123	4
MATH 151	5	PSYC 301	3
PSYC 221	3	Humanities 200-level Course	3
	18		18

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 214	3	BIOL 210	3
CHEM 237	4	MATH 251	4
MATH 152	5	PHYS 221	4
PSYC 310	3	PSYC 204	4
Humanities Elective (300+)	3	Social Sciences Elective[1]	3
	18		18

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 445	3	CHEM 239	3
CHEM 247	3	CHEM 240	2
PSYC 320	3	CS 105	2
PSYC 414	3	MATH 425	3
IPRO Elective I	3	PSYC 435	3
Social Sciences Elective (300+)[1]	3	Biochemistry Elective	2
		IPRO Elective II	3
	18		18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
BIOL 404	3	BIOL 451	2
CHEM 343	3	BIOL 495	1
PSYC 426	3	CHEM 438	3
Humanities Elective (300+)	3	PSYC 485	3
Social Sciences Elective (300+)[1]	3	Dual Degree Elective[2]	3
		Humanities or Social Sciences Elective[1]	3
	18		18

Total Credit Hours: 144

1. B.S. Biochemistry/B.S. Psychological Science students may apply a maximum of three psychology courses to both the social sciences requirements and the psychology electives specified for the psychological science degree requirements (psychology electives must be 300-level and above). At least one of the social science "S" courses must be a non-psychology course.
2. Select one course from the following: BIOL 420, BIOL 430, BIOL 475, or FDSN 401.

Bachelor of Science in Biochemistry/Bachelor of Science in Psychological Science Curriculum - Nine Semester Plan

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100	2	BIOL 115	3
BIOL 107	3	BIOL 117	1
CHEM 124	4	CHEM 125	4
MATH 151	5	PHYS 123	4
PSYC 221	3	PSYC 303	3
	17		15

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 109	1	BIOL 210	3
BIOL 214	3	PHYS 221	4
MATH 152	5	PSYC 204	4
PSYC 203	4	Humanities/Social Sciences Elective[1]	3
Humanities 200-level Course	3		
	16		14

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
CHEM 237	4	CHEM 239	3
MATH 251	4	CHEM 240	2
PSYC 320	3	PSYC 310	3
PSYC 414	3	PSYC 435	3
IPRO Elective I	3	Biochemistry Elective	2
		Dual Degree Elective[2]	3
	17		16

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
CHEM 247	3	BIOL 451	2
CHEM 343	3	CHEM 438	3
CS 105	2	Social Sciences Elective (300+)[1]	3
PSYC 426	3	Humanities Elective (300+)	3
Social Sciences Elective[1]	3	IPRO Elective II	3
	17		17

Year 5

Semester 1	Credit Hours
BIOL 404	3
BIOL 445	3
BIOL 495	1
PSYC 485	3
Humanities Elective (300+)	3

Social Sciences Elective (300+)[1]	3
	16

Total Credit Hours: 145

1 B.S. Biochemistry/B.S. Psychological Science students may apply a maximum of three psychology courses to both the social sciences requirements and the psychology electives specified for the psychological science degree requirements (psychology electives must be 300-level and above). At least one of the social science "S" courses must be a non-psychology course.

2 Select one course from the following: BIOL 420, BIOL 430, BIOL 475, or FDSN 401.

Bachelor of Science in Biology/Bachelor of Science in Psychological Science

This program provides an integrated dual degree program leading to the Bachelor of Science in Biology and the Bachelor of Science in Psychological Science while maintaining the integrity and program content of each individual degree program.

This program has two main target audiences:

1. Pre-health students (pre-MD, pre-clinical psychologist or psychiatrist) who are interested in neurological or behavioral issues. A challenging dual degree program will be an asset in the professional school application process, and this program will provide an excellent preparation for the MCAT.
2. Students interested in moving on to graduate school in studies at the interface of biology and psychology, such as neuroscience, brain science, or cognitive science.

Required Courses

Code	Title	Credit Hours
Biology Requirements		**(34)**
BIOL 107	General Biol Lecture	3
BIOL 109	General Biology Lab	1
BIOL 115	Human Biology	3
BIOL 117	Human Biology Lab	1
BIOL 210	Microbiology	3
BIOL 214	Genetics	3
BIOL 225	Microbiology Laboratory	2
BIOL 401	Introductory Biochemistry	3
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
or BIOL 431	Animal Physiology Laboratory	
or BIOL 446	Cell Biology Laboratory	
BIOL 430	Human Physiology	3
BIOL 445	Cell Biology	3
BIOL 451	Biological Literature	2
BIOL 495	Biology Colloquium	1
Biology Electives		**(6)**
Select six credit hours		6
Chemistry Requirements		**(18)**
CHEM 124	Princ of Chemistry I with Lab	4
CHEM 125	Prin of Chemistry II w/Lab	4
CHEM 237	Organic Chemistry I	4
CHEM 239	Organic Chemistry II	3
CHEM 247	Analytical Chemistry	3
Physics Requirements		**(11)**
PHYS 123	General Physics I: Mechanics	4
PHYS 221	Gen Physics II: Elect&Magntism	4
PHYS 224	Gen Physics III for Engnrs	3
Mathematics Requirements		**(13-14)**
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 425	Statistical Methods	3-4
or PSYC 203	Undergrad Stats Bhvrl Sci	
Psychological Science Requirements		**(28)**
PSYC 204	Rsrch Method in Behavioral Sci	4
PSYC 221	Intro to Psychological Science	3

PSYC 301	Industrial Psychology	3
or PSYC 303	Intro to Psychopathology	
PSYC 310	Social Psychology	3
PSYC 320	Applied Correlation/Regression	3
or PSYC 409	Psychological Testing	
PSYC 414	Neural & Biol Bases Behavior	3
PSYC 426	Cognitive Science	3
PSYC 435	Child Development	3
or PSYC 436	Adult Development	
PSYC 485	Senior Capstone Project I	3
Psychological Science Electives		**(6)**
Select six credit hours		6
Introduction to the Profession		**(3)**
BIOL 100	Intro to Profession	3
or PSYC 100	Intro to Profession	
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)		6
Humanities and Social Sciences Requirements		**(15)**
See Illinois Tech Core Curriculum, sections B and C (p. 24) [1]		15
Total Credit Hours		142-143

1 B.S. Biology/B.S. Psychological Science students have a reduced humanities and social sciences requirement because six credit hours of social sciences are satisfied by six credit hours of psychology "S" designated courses.

Bachelor of Science in Biology/Bachelor of Science in Psychological Science Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 100 or PSYC 100	3	BIOL 115	3
BIOL 107	3	BIOL 117	1
PSYC 221	3	PSYC 301	3
CHEM 124	4	CHEM 125	4
MATH 151	5	MATH 152	5
		CS 105 or 110	2
	18		18

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 109	1	BIOL 210	3
BIOL 214	3	BIOL 225	2
PSYC 310	3	Psychological Science Elective	3
CHEM 237	4	CHEM 239	3
PHYS 123	4	PHYS 221	4
Humanities 200-level Course	3	Humanities Elective (300+)	3
	18		18

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 445	3	BIOL 430	3
Biology Elective	3	BIOL 495	1
PSYC 414	3	PSYC 204	4
PHYS 224	3	PSYC 320 or 409	3
IPRO Elective I	3	MATH 425 or PSYC 203	3-4
Social Sciences Elective	3	IPRO Elective II	3
	18		17-18

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
BIOL 401	3	BIOL 402	3
BIOL 404, 431, or 446	3	BIOL 451	2
Psychological Science Elective	3	PSYC 435 or 436	3
PSYC 426	3	PSYC 485	3
CHEM 247	3	Biology Elective	3
Humanities Elective (300+)	3	Humanities or Social Sciences Elective	3
	18		17

Total Credit Hours: 142-143

Minor in Human Resources

Required Courses

Code	Title		Credit Hours
PSYC 203	Undergrad Stats Bhvrl Sci		3-4
or PSYC 320	Applied Correlation/Regression		
PSYC 301	Industrial Psychology		3
Select a minimum of three courses from the following:			9
PSYC 310	Social Psychology	3	
PSYC 370	Health and Safety at Work	3	
PSYC 409	Psychological Testing	3	
PSYC 455	Dev and Eval of Traing Orgs	3	
PSYC 481	Group&Leadership at Work	3	
Total Credit Hours			15-16

Minor in Leadership

Required Courses

Code	Title		Credit Hours
PSYC 250	Leadership: Concepts/Practices		3
Select a minimum of four courses from the following:			12
BUS 301	Organizational Behavior	3	
COM 371	Persuasion	3	
COM 380	Topics in Communication	3	
COM 435	Intercultural Communication	3	
INTM 301	Communications for Workplace	3	
INTM 322	Ind Project Management	3	
ITMM 470	Fund of Mgmt for Tech Prof	3	
ITMM 471	Project Management for ITM	3	
MILS 301	Leadership&PRBLM SLVNG	3	
MILS 302	Leadership and Ethics	3	
MILS 401	Leadership&Management	3	
PHIL 332	Political Philosophy	3	
PS 232	Democracy, Dictator, & Develop	3	
PS 306	Politics and Public Policy	3	
PS 351	Public Administration	3	
PSYC 310	Social Psychology	3	
PSYC 312	Human Motivation and Emotion	3	
PSYC 481	Group&Leadership at Work	3	
SOC 305	Social Communication	3	
SOC 340	Social Orgn and Control	3	
SSCI 210	Social and Political Thought	3	
SSCI 422	Complex Organizations	3	
Total Credit Hours			15

Minor in Psychology

Required Courses

Code	Title	Credit Hours
PSYC 203	Undergrad Stats Bhvrl Sci	3-4
or PSYC 320	Applied Correlation/Regression	
PSYC 221	Intro to Psychological Science	3
Select at least nine additional credit hours of psychology courses		9
Total Credit Hours		15-16

Minor in Rehabilitation Services

Required Courses

Code	Title	Credit Hours
PSYC 410	Intro Rehab/Mental Health Cslg	3
PSYC 411	Medcl Aspects of Dsblng Cond	3
PSYC 412	Multicultural/Psychosocial Iss	3
PSYC 583	Rehab Engineering Technology I	3
PSYC 590	Psychiatric Rehabilitation	3
Total Credit Hours		15

Social Sciences

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Chair
Jonathan Rosenberg

Associate Chair
Rebecca Steffenson

Faculty with Research Interests
For information regarding faculty visit the Department of Social Sciences website.

The Department of Social Sciences offers three undergraduate degrees:

1. Bachelor of Science (B.S.) in Global Studies
2. Bachelor of Science (B.S.) in Science, Technology, and Society
3. Bachelor of Science (B.S.) in Social and Economic Development Policy

The department offers minors in policy, political science, and sociology, and collaborates with other university departments to offer interdisciplinary minors in global studies and urban affairs.

Also offered are two accelerated degree programs: a B.S./J.D. program with Chicago-Kent College of Law that can be completed in six years, and a B.S./M.P.A. program with Stuart School of Business that can be completed in five years.

The department offers a variety of courses to broaden the student's education and to fulfill the Illinois Institute of Technology Core Curriculum requirements. Courses from political science (PS), sociology (SOC), and interdisciplinary social science (SSCI) are administered through the Department of Social Sciences.

Degree Programs

Co-Terminal Options

The Department of Social Sciences also offers the following co-terminal degree, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Social and Economic Development Policy/Master of Public Administration

This co-terminal degree allows students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Department of Social Sciences website (iit.edu/social-sciences).

Minors

Bachelor of Science in Global Studies

The Bachelor of Science in Global Studies is an interdisciplinary degree that draws from coursework in the social sciences, humanities, and related fields. Global studies students examine the political, economic, cultural, and social forces that transect and sometimes blur the borders among nations and communities. The major provides students with the opportunity to understand and critically evaluate the broad trends that shape our increasingly globalized world and to focus on the issues that most interest and motivate them. The flexibility of the degree allows students to discover and pursue their own interests in areas such as: global governance, environmental sustainability, public health, human migration, and the challenges facing particular regions of the world.

The B.S. in Global Studies provides students with a diverse toolkit containing the knowledge, concepts, and skills they will need to understand and meet the challenges of an increasingly interconnected world. Students are trained in several of the quantitative and qualitative methods of research and analysis valued by employers in a vast array of organizations, institutions, and businesses involved in global affairs. These may include geographic information systems, program evaluation and policy analysis, and intercultural communication. Global studies can also prepare students for pursuing advanced degrees in a variety of academic and professional fields.

The objectives of the global studies major are to develop in its graduates:

- A clear understanding of global issues and the global connectivity of people and places
- The skills needed to analyze global challenges and critically evaluate existing approaches to dealing with them
- The ability to communicate appropriately in different formats across disciplines and across cultures
- An understanding of the careers available to global studies majors and the ability to seek out relevant pre-professional experience

Students will be required to complete 47 credit hours of core courses, a 120-hour internship requirement, and a language or international experience requirement.

Required Courses

Code	Title		Credit Hours
Global Studies Requirements			**(47)**
LCHS 100	Intro to the Professions		2
Choose one world history course from the following:			3
HIST 311	20th Century Europe:1890-1945	3	
HIST 340	Rise of Global Economy	3	
ECON 211	Principles of Economics [1]		3
PS 230	International Relations		3
PS 232	Democracy, Dictator, & Develop		3
Choose one social science methods sequence:			6
Option 1			
SSCI 225	Geographic Information Systems	3	
SSCI 325	Intermediate Geo Info Systems	3	
Option 2			
SSCI 209	Social Science Research Method	3	
PSYC 320	Applied Correlation/Regression	3	
or SSCI 387	Fieldwork Methods		
COM 435	Intercultural Communication		3
PS 313	Comparative Public Policy		3
PS 360	Global Political Economy		3
Choose one global development course from the following:			3
PS 388	International Law and Orgs	3	
SSCI 318	Global Health	3	
SSCI 376	Global Migration	3	
SSCI 380	International Development	3	
Choose a minimum of three global studies electives from the following:			9
BUS 452	International Finance	3	
HIST 305	Latin America 1810-Present	3	
HIST 306	Women in Latin American Hist	3	
HIST 311	20th Century Europe:1890-1945	3	

HIST 345	Women World 20th Century	3	
HIST 351	The City in World History	3	
PS 329	Environmental Politics/Policy	3	
PS 372	Govt and Politics in Africa	3	
PS 373	East Asian Political Economy	3	
PS 374	Politics of Europe	3	
PS 375	Politics of Latin America	3	
PSYC 355	Cross-Cultural Psychology	3	
SSCI 220	Global Chicago	3	
SSCI 319	Comparative Health Systems	3	
SSCI 380	International Development	3	
SSCI 486	Planning, Fundraising, & Eval		3
SSCI 493	Public Service Internship		3
Language proficiency or international experience (see below for more information)			0
Mathematics Requirements			**(6-7)**
Select two courses at the level of MATH 119 or above including PSYC 203 or BUS 221			6-7
Humanities and Social Science Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Natural Sciences Requirements			**(10-11)**
See Illinois Tech Core Curriculum, section D (p. 25)			10-11
Computer Science Requirement			**(2)**
CS 110	Computing Principles		2
Interprofessional Projects			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Free Electives			**(33-34)**
Select 33-34 credit hours			33-34

Minimum degree credits required: 126

[1] Students who have had Introduction to Microeconomics may substitute ECON 152.

Language Proficiency or International Experience Requirement

The language proficiency/international experience requirement may be satisfied in the following ways, subject to adviser approval:

- Participation in local events focusing on globalization and international affairs

AND

- Language proficiency (satisfaction of Illinois Tech requirement through proficiency exam and/or coursework; ETS proficiency exam; CLEP; the successful completion of intermediate level (second year) language coursework from an accredited institution with a "C" grade or better; or AP language credits)

OR

- International/experiential participation (international internship; locally-based internship with international focus; or study abroad)

Bachelor of Science in Global Studies Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
ECON 211	3	PS 230	3
LCHS 100	2	World History Course[2]	3
PS 232	3	Natural Science or Engineering Elective	4
Mathematics Elective[1]	4	Mathematics Elective[1]	3
Humanities 200-level Course	3	Social Science Elective	3
		Free Elective	3
	15		19

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
COM 435	3	PS 360	3
CS 110	2	Social Science Methods Course II[3]	3
Social Science Methods Course I[3]	3	Natural Science or Engineering Elective	3
Natural Science or Engineering Elective	4	Social Science Elective (300+)	3
Humanities Elective (300+)	3	Free Elective	3
Free Elective	2		
	17		15

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
PS 313	3	Global Studies Elective[5]	3
Global Development Course[4]	3	Global Studies Elective[5]	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
SSCI 486	3	SSCI 493	3
Global Studies Elective[5]	3	IPRO Elective II	3
IPRO Elective I	3	Humanities or Social Science Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Total Credit Hours: 126

1. Two mathematics courses at the level of MATH 119 or above, including PSYC 203 or BUS 221.
2. Choose from HIST 311 or HIST 340.
3. Students must choose one of the following social science methods sequences: SSCI 225 and SSCI 325; or SSCI 209 and (PSYC 320 or SSCI 387).
4. Choose from PS 388, SSCI 318, SSCI 376, or SSCI 380.
5. Choose from BUS 452, HIST 305, HIST 306, HIST 311, HIST 345, HIST 351, PS 329, PS 372, PS 373, PS 374, PS 375, PSYC 355, SSCI 220, SSCI 319, or SSCI 380.

Bachelor of Science in Science, Technology, and Society

Required Courses

Code	Title		Credit Hours
Science, Technology, and Society Requirements			**(32)**
LCHS 100	Intro to the Professions		2
LCHS 2XX Introduction to Science, Technology, and Society			3
HUM 380	Topics in Humanities (History of Science)		3
or HIST 375	History of Computing		
PHIL 360	Ethics		3
PS 332	Politics of Sci and Technolgy		3
SSCI 209	Social Science Research Method		3
SOC 302	Science and Belief		3
SOC 322	Sociology of Objects & Tech		3
Select one of the following theory courses:			3
SOC 301	Social Dimension of Science	3	
SOC 303	Science in Society	3	
PHIL 351	Science and Values	3	
Select two of the following research methods courses:			6
COM 383	Social Networks	3	
COM 435	Intercultural Communication	3	
SOC 305	Social Communication	3	
SSCI 225	Geographic Information Systems	3	
SSCI 325	Intermediate Geo Info Systems	3	
SSCI 385	Special Topics	3	
SSCI 386	Qual Soc Sci Research Methods	3	
SSCI 387	Fieldwork Methods	3	
SSCI 389	Urban Planning Analysis	3	
SSCI 480	Intro to Survey Methodology	3	
Capstone Requirement			**(3)**
PS 408	Methods of Policy Analysis		3
or SSCI 486	Planning, Fundraising, & Eval		
Internship Requirement			**(3)**
SSCI 493	Public Service Internship [1]		3
Science, Technology, and Society Specialization			**(15)**
Select Science, Technology, and Environmental Policy or Information, Communication, and Society. See Specializations tab for requirements.			15
Minor Requirement			**(15)**
Select 15 credit hours [2]			15
Mathematics Requirements			**(6-7)**
Select two courses at the level of MATH 119 or above including PSYC 203 or BUS 221			6-7
Natural Sciences Requirement			**(10)**
See Illinois Tech Core Curriculum, section D (p. 25)			10
Computer Science Requirement			**(2)**
CS 105	Intro to Computer Programming		2
or CS 110	Computing Principles		
Humanities and Social Science Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Free Electives			**(15)**

Select 15 credit hours	15
Total Credit Hours	128-129

[1] SSCI 493 may be substituted with a 300+-level STS elective.

[2] Minors will be selected in consultation with the program director/adviser based on the student's interests, goals, and academic qualifications for successfully completing the required coursework. Transfer students may be approved for a substitution of a minimum of 15 credit hours of appropriate STEM coursework above and beyond Core Curriculum requirements. Students who enter Illinois Tech as Science, Technology, and Society majors may consult with the undergraduate program director about similar substitutions as well. All such substitutions must be approved by the program director.

Bachelor of Science in Science, Technology, and Society

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
CS 105 or 110	2	SSCI 209	3
LCHS 100	2	Humanities or Social Sciences Elective	3
LCHS 2XX Intro to Science, Technology, and Society	3	Mathematics Elective[1]	3
Humanities 200-level Course	3	Natural Science or Engineering Elective	4
Mathematics Elective[1]	4	Specialization Elective[2]	3
Natural Science or Engineering Elective	3		
	17		16

			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PS 332	3	HUM 380 or HIST 375	3
SOC 301, 303, or PHIL 351	3	SOC 322	3
Research Methods Course[3]	3	Research Methods Course[3]	3
Minor Elective	3	Specialization Elective[2]	3
Natural Science or Engineering Elective	3	Minor Elective	3
	15		15

			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
SOC 302	3	SSCI 493[4]	3
PHIL 360	3	Minor Elective	3
Specialization Elective[2]	3	Humanities Elective (300+)	3
Minor Elective	3	IPRO Elective I	3
Humanities Elective (300+)	3	Free Elective	3
	15		15

			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
PS 408 or SSCI 486	3	Specialization Elective[2]	3
Specialization Elective[2]	3	Minor Elective	3
IPRO Elective II	3	Social Sciences Elective	3
Social Sciences Elective (300+)	3	Social Sciences Elective (300+)	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	18		18

Total Credit Hours: 129

1. Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221.
2. Select from Science, Technology, and Environmental Policy or Information, Communication, and Society; see Specializations tab for requirements.
3. Select from COM 383, COM 435, SOC 305, SSCI 225, SSCI 325, SSCI 385, SSCI 386, SSCI 387, SSCI 389, or SSCI 480.
4. SSCI 493 may be substituted with a 300+-level STS elective.

Science, Technology, and Society Specializations

Science, Technology, and Environmental Policy

Code	Title		Credit Hours
Required Courses			**(6)**
PS 306	Politics and Public Policy		3
or PS 313	Comparative Public Policy		
SSCI 378	Innovation Policy		3
Elective Courses			**(9)**
Select three of the following courses:			9
PS 306	Politics and Public Policy	3	
or PS 313	Comparative Public Policy		
PS 329	Environmental Politics/Policy	3	
PS 338	Energy Policy	3	
PS 360	Global Political Economy	3	
or PS 388	International Law and Orgs		
SSCI 204	States, Markets, and Society	3	
SSCI 318	Global Health	3	
SSCI 320	Accidents/Disasters/Security	3	
SSCI 354	Urban Policy	3	
SSCI 359		3	
SSCI 380	International Development	3	
Total Credit Hours			15

Information, Communication, and Society

Code	Title		Credit Hours
Required Courses			**(6)**
PHIL 370	Engineering Ethics		3
or PHIL 380	Topics in Philosophy		
Select one of the following courses:			3
HIST 355	Digital Labor	3	
HIST 385	Women in Computing History	3	
HUM 352	Gender & Technological Change	3	
SSCI 321	Social Inequality	3	
Elective Courses			**(9)**
Select three of the following courses:			9
COM 323	Communicating Science	3	
COM 372	Mass Media Society	3	
COM 380	Topics in Communication (Social Media and Society)	3	
COM 383	Social Networks	3	
COM 384	Humanizing Technology	3	
HIST 355	Digital Labor	3	
HIST 385	Women in Computing History	3	
HUM 352	Gender & Technological Change	3	
HUM 380	Topics in Humanities (Philosophy of Decision Making)	3	
PHIL 370	Engineering Ethics	3	
PHIL 380	Topics in Philosophy (Ethics of Communications Technology)	3	
Total Credit Hours			15

Bachelor of Science in Social and Economic Development Policy

The Bachelor of Science in Social and Economic Development Policy (SEDP) is an interdisciplinary social science degree grounded in the analysis of global and domestic economic, social, and political development. The program is designed to foster globally-engaged civic leadership. Our students learn about the impact of globalization on local communities, cities, regions, and nations. They specialize in either urban and regional or international development, and learn how to understand and address major challenges to equitable and sustainable economic growth and healthy communities. They acquire the knowledge and develop the skills needed to assess and analyze issues that are central to the work of governing in the global age, from local agencies to international organizations. Our students build the confidence and competence they will need to affect policy in a variety of areas related to development in both the public and private sectors. The program prepares graduates for careers that require an understanding of how and why policy is made, how to analyze its effects, and how to make it better.

Students will be required to complete 30 credit hours of core courses and at least one 15 credit hour specialization. Majors are also required to complete 15 minor credit hours in applied economics. The senior capstone project requires students to complete a 120-hour internship.

The objective of the social and economic development policy program is to develop graduates who can demonstrate:

- Fundamental knowledge of the development field across the social sciences
- Ability to analyze and critically evaluate development problems and solutions
- Effective written and verbal communication skills
- A commitment to positive change in their communities

Required Courses

Code	Title		Credit Hours
Social and Economic Development Policy Requirements			**(32)**
LCHS 100	Intro to the Professions		2
PS 232	Democracy, Dictator, & Develop		3
PS 306	Politics and Public Policy		3
PS 313	Comparative Public Policy		3
PS 360	Global Political Economy		3
PS 408	Methods of Policy Analysis		3
SSCI 209	Social Science Research Method		3
SSCI 486	Planning, Fundraising, & Eval		3
SSCI 493	Public Service Internship		3
Select two Research Methods electives from the following:			6
COM 383	Social Networks	3	
PSYC 320	Applied Correlation/Regression	3	
PSYC 409	Psychological Testing	3	
SOC 498	Exercises Bhvrl Observation	3	
SSCI 225	Geographic Information Systems	3	
SSCI 325	Intermediate Geo Info Systems	3	
SSCI 387	Fieldwork Methods	3	
SSCI 389	Urban Planning Analysis	3	
SSCI 480	Intro to Survey Methodology	3	
or additional research methods courses with adviser approval			
Social and Economic Development Policy Specialization			**(15)**
Select International Development or Urban and Regional Development. See Specializations tab for requirements.			15
Mathematics Requirements			**(6-7)**
Select two courses at the level of MATH 119 or above including PSYC 203 or BUS 221			6-7
Natural Sciences Requirements			**(11)**
See Illinois Tech Core Curriculum, section D (p. 25)			11
Computer Science Requirement			**(2)**
CS 105	Intro to Computer Programming		2
or CS 110	Computing Principles		
Economics Minor Requirements			**(15)**

Other minors may be substituted with program director approval.

BUS 382	Business Economics		3
ECON 151	Microeconomics		3
ECON 152	Global Economics		3
ECON 423	Econ Anal Capital Investments		3
Select one of the following courses:			3
BUS 321	Optimization and Decision-Maki	3	
BUS 452	International Finance	3	
BUS 455	Corporate Finance	3	
Humanities and Social Science Requirements			**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)			21
Interprofessional Projects			**(6)**
See Illinois Tech Core Curriculum, section E (p. 25)			6
Free Electives			**(22)**
Select 22 credit hours			22
Total Credit Hours			130-131

Bachelor of Science in Social and Economic Development Policy Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
LCHS 100	2	ECON 152	3
ECON 151	3	PS 313	3
PS 232	3	Specialization Elective[2]	3
Mathematics Elective[1]	3	Mathematics Elective[1]	3
Humanities 200-level Course	3	Natural Science or Engineering Elective	3
		Humanities Elective (300+)	3
	14		18

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
SSCI 209	3	CS 105 or 110	2
PS 306	3	Research Methods Course[3]	3
PS 360	3	Natural Science or Engineering Elective	3
ECON 423	3	Social Sciences Elective (300+)	3
Natural Science or Engineering Elective	3	Humanities Elective (300+)	3
Specialization Elective[2]	3	Economics Minor Elective	3
	18		17

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
PS 408	3	Research Methods Course[3]	3
Specialization Elective[2]	3	Specialization Elective[2]	3
Specialization Elective[2]	3	Social Sciences Elective	3
Economics Minor Elective	3	IPRO Elective I	3
Natural Science or Engineering Elective	3	Free Elective	3
Free Elective	3		
	18		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
SSCI 486	3	SSCI 493	3
IPRO Elective II	3	Social Sciences Elective (300+)	3
Humanities or Social Sciences Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Total Credit Hours: 130

1. Two courses at the level of MATH 119 or above including PSYC 203 or BUS 221.
2. Select from International Development or Urban and Regional Development; see Specializations tab for requirements.
3. Select from COM 383, PSYC 320, PSYC 409, SOC 498, SSCI 225, SSCI 325, SSCI 387, SSCI 389, SSCI 480, or additional research methods course with adviser approval.

Social and Economic Development Policy Specializations

International Development

Code	Title		Credit Hours
Required Courses			**(9)**
PS 230	International Relations		3
PS 388	International Law and Orgs		3
SSCI 318	Global Health		3
or SSCI 376	Global Migration		
or SSCI 380	International Development		
Elective Courses			**(6)**
Select two of the following:			6
BUS 341	Business Law	3	
COM 435	Intercultural Communication	3	
PS 372	Govt and Politics in Africa	3	
PS 375	Politics of Latin America	3	
PSYC 455	Dev and Eval of Traing Orgs	3	
PSYC 481	Group&Leadership at Work	3	
SSCI 323	Problems of Multi-Ethnic/Relig	3	
SSCI 376	Global Migration	3	
Total Credit Hours			15

Additional courses may be approved by the program director.

Urban and Regional Development

Code	Title		Credit Hours
Required Courses			**(9)**
PS 214	State and Local Government		3
SSCI 354	Urban Policy		3
SSCI 355	Regional Economic Development		3
Elective Courses			**(6)**
Select two of the following:			6
COM 421	Technical Communication	3	
HIST 350	US Urban History	3	
HIST 352	History of Chicago	3	
PS 373	East Asian Political Economy	3	
PS 374	Politics of Europe	3	
PSYC 455	Dev and Eval of Traing Orgs	3	
PSYC 481	Group&Leadership at Work	3	
SSCI 220	Global Chicago	3	
SSCI 354	Urban Policy	3	
SSCI 376	Global Migration	3	
Total Credit Hours			15

Additional courses may be approved by the program director.

Minor in Global Studies

Required Courses

Code	Title		Credit Hours
Select a minimum of two courses from the following humanities courses:			6
COM 306	World Englishes	3	
COM 435	Intercultural Communication	3	
HIST 305	Latin America 1810-Present	3	
HIST 306	Women in Latin American Hist	3	
HIST 307	Latin American Hist Thru Film	3	
HIST 311	20th Century Europe:1890-1945	3	
Select a minimum of three courses from the following social sciences courses: [1]			9
PS 230	International Relations	3	
PS 232	Democracy, Dictator, & Develop	3	
PS 313	Comparative Public Policy	3	
PS 329	Environmental Politics/Policy	3	
PS 360	Global Political Economy	3	
PS 372	Govt and Politics in Africa	3	
PS 373	East Asian Political Economy	3	
PS 374	Politics of Europe	3	
PS 375	Politics of Latin America	3	
PS 388	International Law and Orgs	3	
SSCI 220	Global Chicago	3	
SSCI 318	Global Health	3	
SSCI 319	Comparative Health Systems	3	
SSCI 323	Problems of Multi-Ethnic/Relig	3	
SSCI 376	Global Migration	3	
SSCI 380	International Development	3	

[1] For the social sciences courses, two courses must be at the 300-level. Social sciences courses should also be chosen from at least two fields, and at least six credit hours must be in a single field. Students can take two SSCI courses and one PS course, or two PS courses and one SSCI course, but cannot take three SSCI courses.

Additional courses, including rotating topics courses, may be approved by the humanities or social sciences associate chairs.

Minor in Political Science

Required Courses

This minor consists of 15 credit hours.

Code	Title		Credit Hours
Select a minimum of two courses from the following:			6
PS 200	American Government	3	
PS 214	State and Local Government	3	
PS 230	International Relations	3	
PS 232	Democracy, Dictator, & Develop	3	
Select three additional political science courses			9
Total Credit Hours			15

Minor in Public Policy

Required Courses

Code	Title		Credit Hours
PS 306	Politics and Public Policy		3
PS 408	Methods of Policy Analysis		3
SSCI 209	Social Science Research Method		3
Select a minimum of two courses from the following:			6
PS 312	Analysis Eval of Public Policy	3	
PS 313	Comparative Public Policy	3	
PS 338	Energy Policy	3	
SSCI 354	Urban Policy	3	
Total Credit Hours			15

Minor in Sociology

Required Courses

Code	Title	Credit Hours
SOC 200	Introduction to Sociology	3
or SOC 203	Engaging Sociology	
Select four additional sociology courses		12
Total Credit Hours		15

Stuart School of Business

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Faculty with Research Interests
For information regarding faculty visit the Stuart School of Business website.

Stuart School of Business provides intellectually rigorous business and management education at all levels, from baccalaureate to doctoral. The Stuart School is committed to creating well-rounded students who are equipped with expert academic knowledge, and also possess the interpersonal skills and professional experiences that are critical to academic and career success. The school is dedicated to continuing to offer opportunities to Stuart's diverse faculty, staff, student, and community populations—not only in the Chicago area, but also globally. Our mission states: The Stuart School combines rigorous, relevant, and interdisciplinary academic and practice-oriented research and education. Our approach results in thought leadership and advances students' careers in technologically-oriented private and public sector industries worldwide. Stuart was established in 1969 with a gift from Illinois Institute of Technology alumnus and noted financier Harold Leonard Stuart.

Stuart offers the following degrees: B.S. in Business Administration, co-terminal B.S.B.A. and M.P.A, co-terminal B.S.B.A. and M.S. in Finance, co-terminal B.S.B.A. and M.S. in Marketing Analytics, Master of Business Administration (M.B.A.), Master of Mathematical Finance (M.M.F.) offered in partnership with the College of Science Department of Applied Mathematics, M.S. in Environmental Management and Sustainability, M.S. in Finance, M.S. in Management Science, M.S. in Marketing Analytics, Master of Public Administration (M.P.A.), Master of Technological Entrepreneurship, and Ph.D. in Management Science. A series of dual degrees with Chicago-Kent College of Law and Institute of Design are also offered, as well as numerous graduate certificate programs.

At Stuart School of Business, students learn business in a hands-on, innovative way that prepares them for careers in finance, management, marketing, or to launch their own entrepreneurial ventures. Earning a business degree at a tech school often leads to working and studying side by side with engineers, scientists, programmers, and architects. Students also learn how to collaborate with, and to lead interdisciplinary teams by working on highly innovative, technology-driven, real-world projects.

The Bachelor of Science in Business Administration (B.S.B.A.) not only offers specializations in marketing and finance, but also allows students to go beyond these traditional fields to select a specialization in many departments or schools within the university that approve the specialization. Such specializations could include, but are not limited to, applied mathematics, chemistry, construction management, information technology, life sciences, logistics, and material sciences, among others.

This distinctive program is designed to educate students to deal with the problems of an increasingly complex business environment. In conjunction with the university Core Curriculum requirement, with its focus on mathematics, computer science, and natural sciences, the business curriculum helps students gain practice of business administration.

The objectives of this program are to provide future business owners, managers, and leaders with:

- A solid technological foundation for the new and emerging business environment
- A fundamental grounding in the core competencies of business including accounting, economics, finance, marketing, management, and social skills
- An understanding of the interdisciplinary nature of management in today's complex businesses, which compete in the global economy

Degree Programs

- Bachelor of Science in Business Administration (p. 310)

Co-Terminal Options

The Stuart School of Business also offers the following co-terminal degrees, which enables a student to simultaneously complete both an undergraduate and graduate degree in as few as five years:

- Bachelor of Science in Business Administration/Master of Public Administration
- Bachelor of Science in Business Administration/Master of Science in Finance
- Bachelor of Science in Business Administration/Master of Science in Marketing Analytics
- Bachelor of Science in Engineering Management/Master of Public Administration
- Bachelor of Science in Social and Economic Development Policy/Master of Public Administration

Co-terminal degrees allow students to gain greater knowledge in specialized areas while, in most cases, completing a smaller number of credit hours with increased scheduling flexibility. For more information, please visit the Stuart School of Business website (stuart.iit.edu).

Minors

- Minor in Business (p. 313)
- Minor in Economics (p. 313)
- Minor in Entrepreneurship (p. 313)
- Minor in Finance (p. 314)
- Minor in Public Administration (p. 314)

Bachelor of Science in Business Administration

The Bachelor of Science in Business Administration provides a solid foundation in business fundamentals along with a basic grounding in science. Core business competencies include accounting, economics, statistics, finance, business law, marketing, management, entrepreneurship, and leadership. Students also take a specialization that allows them to develop a depth of knowledge in a business field or another field of their choosing. Currently available business specializations are in finance and marketing, while specializations outside of business include applied math, architecture, construction management, logistics, and psychology, among others. In addition, the program's flexibility allows specializations to be created to meet a student's special needs.

Code	Title	Credit Hours
BUS 100	Introduction to Business	3
BUS 102	Computing Tools Bus Analysis	3
BUS 104	Needs Anlys/Opportunity Anlys	1
BUS 204	Iden/Eval Competitve Advantage	1
BUS 211	Financial Accounting	3
BUS 221	Business Statistics	3
BUS 303	Financial Analysis	1
BUS 311	Strategic Cost Management	3
BUS 341	Business Law	3
BUS 351	Financial Decision-Making	3
BUS 361	Entrepreneurship I	3
BUS 371	Marketing Fundamentals	3
BUS 382	Business Economics	3
BUS 403	Devlpng Strat Comptve Bus Plan	1
BUS 404	Selling Your Business Plan	1
BUS 452	International Finance	3
BUS 454	Investments	3
BUS 455	Corporate Finance	3
BUS 456	Financial Economics I	3
BUS 457	Financial Modeling I	3
BUS 458	Financial Derivatives	3
BUS 467	Entrepreneurship II	3
BUS 469	Entrepreneurship Capstone	3
BUS 471	Marketing Management	3
BUS 472	New Product Development	3
BUS 473	Marketing Research	3
BUS 475	Sales Management	3
BUS 476	Consumer Behavior	3
BUS 480	Strategic Management and Desig	3
BUS 497	Independent Study in Business	1-6
BUS 498	UG Workplace Immersion	3
BUS 510	Strategy & Innovation	3
BUS 550	Business Statistics	3
BUS 590	Business Strategy Capstone Pro	3
BUS 598	Graduate Workplace Immersion	3
BUS 321	Optimization and Decision-Maki	3
BUS 305	Operation and Supply Chain Des	3
BUS 301	Organizational Behavior	3
BUS 212	Managerial Accounting	3
BUS 210	Accounting for Non-Business Ma	3
BUS 203	Iden/Eval Prospect Consumers	1
BUS 103	Ideation: What Are My Intersts	1

Required Courses

Code	Title	Credit Hours
Business Requirements		**(51)**
BUS 100	Introduction to Business	3
BUS 102	Computing Tools Bus Analysis	3
BUS 211	Financial Accounting	3
BUS 212	Managerial Accounting	3
BUS 221	Business Statistics	3
BUS 301	Organizational Behavior	3
BUS 305	Operation and Supply Chain Des	3
BUS 311	Strategic Cost Management	3
BUS 321	Optimization and Decision-Maki	3
BUS 341	Business Law	3
BUS 351	Financial Decision-Making	3
BUS 361	Entrepreneurship I	3
BUS 371	Marketing Fundamentals	3
BUS 467	Entrepreneurship II	3
BUS 480	Strategic Management and Desig	3
ECON 151	Microeconomics	3
ECON 152	Global Economics	3
Business Elective		**(3)**
Select three credit hours of electives		3
Specialization Courses		**(15)**
Select 15 credit hours in an area of specialization		15
Mathematics Requirements		**(5)**
MATH 151	Calculus I	5
Natural Science and Engineering Requirements		**(11)**
See Illinois Tech Core Curriculum, section D (p. 25)		11
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C (p. 24)		21
Computer Science Requirement		**(2)**
CS 105	Intro to Computer Programming	2
or CS 110	Computing Principles	
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E (p. 25) [1]		6
Free Electives		**(12)**
Select 12 credit hours of electives		12
Total Credit Hours		126

1 Strongly recommended that the first IPRO elective be IPRO 397.

Bachelor of Science in Business Administration Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BUS 100	3	BUS 102	3
ECON 151	3	BUS 221	3
MATH 151	5	ECON 152	3
CS 105	2	Science Elective	4
Humanities 200-level Course	3	Social Sciences Elective	3
	16		16
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BUS 211	3	BUS 212	3
BUS 301	3	BUS 341	3
Science Elective	4	BUS 351	3
Science Elective	3	BUS 371	3
Humanities or Social Sciences Elective	3	Humanities Elective (300+)	3
	16		15
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BUS 311	3	BUS 305	3
BUS 321	3	Specialization Elective[1]	3
BUS 361	3	Specialization Elective[1]	3
Specialization Elective[1]	3	IPRO Elective I[2]	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
	15		15
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
BUS 467	3	BUS 480	3
IPRO Elective II	3	Specialization Elective[1]	3
Business Elective	3	Free Elective	3
Specialization Elective[1]	3	Free Elective	3
Social Sciences Elective (300+)	3	Free Elective	3
Free Elective	3		
	18		15

Total Credit Hours: 126

1. At least 15 semester hours in a designated specialization.
2. Strongly recommend this IPRO elective be IPRO 397.

Minor in Business

Required Courses

Code	Title		Credit Hours
BUS 210	Accounting for Non-Business Ma		3
or BUS 211 & BUS 212	Financial Accounting and Managerial Accounting		
ECON 211	Principles of Economics		3
or ECON 151 & ECON 152	Microeconomics and Global Economics		
BUS 301	Organizational Behavior		3
Select a minimum of two courses from the following:			6
BUS 305	Operation and Supply Chain Des	3	
BUS 371	Marketing Fundamentals	3	
ECON 423	Econ Anal Capital Investments	3	
Chemical engineering majors should also take CHE 426 or another engineering science course			
Total Credit Hours			15

A maximum of three courses may be shared between the Business minor and the Entrepreneurship minor.

Minor in Economics

Required Courses

Code	Title		Credit Hours
BUS 382	Business Economics		3
ECON 151	Microeconomics		3
ECON 152	Global Economics		3
ECON 423	Econ Anal Capital Investments		3
Select a minimum of one course from the following:			3
BUS 321	Optimization and Decision-Maki	3	
BUS 452	International Finance	3	
BUS 455	Corporate Finance	3	
Total Credit Hours			15

Minor in Entrepreneurship

Required Courses

Code	Title	Credit Hours
BUS 210	Accounting for Non-Business Ma	3
BUS 371	Marketing Fundamentals	3
BUS 469	Entrepreneurship Capstone	3
ECON 211	Principles of Economics	3
ECON 423	Econ Anal Capital Investments	3
Total Credit Hours		15

A maximum of three courses may be shared between the Business minor and the Entrepreneurship minor.

Minor in Finance

Required Courses

Code	Title		Credit Hours
BUS 210	Accounting for Non-Business Ma		3
ECON 211	Principles of Economics		3
ECON 423	Econ Anal Capital Investments		3
Select a minimum of two courses from the following:			6
BUS 452	International Finance	3	
BUS 454	Investments	3	
BUS 455	Corporate Finance	3	
BUS 458	Financial Derivatives	3	
Total Credit Hours			15

Minor in Public Administration

Required Courses

Code	Title	Credit Hours
PS 200	American Government	3
PS 214	State and Local Government	3
PS 306	Politics and Public Policy	3
PS 315	Urban Politics	3
PS 351	Public Administration	3
Total Credit Hours		15

Graduate Education at Illinois Institute of Technology

The objective of Illinois Institute of Technology's graduate education is to provide programs that enhance students' fundamental knowledge in their chosen field. The university seeks to educate and mentor graduate students to function in a global community with an appreciation of the economic, environmental, and social forces that impact professional choices.

To strengthen the university's leadership role in higher education, emphasis is placed on the core research competencies and enhancing partnerships with industry, government laboratories, and academic and research institutions.

Chicago-Kent College of Law

Anita K. Krug
Dean
565 W. Adams St.
Chicago, IL 60661
312.906.5000
kentlaw.iit.edu

Chicago-Kent College of Law is the second-oldest law school in Illinois. When it joined the university in 1969, Illinois Institute of Technology became the first major institute of technology to include law among its disciplines.

Chicago-Kent offers programs leading to the degrees of Juris Doctor, Master of Laws, and Doctor of the Science of Law, and participates in joint-degree programs with Stuart School of Business and the University of Illinois-Chicago.

Institute of Design

Denis Weil
Dean
3137 S. Federal St.
Chicago, IL 60616
312.595.4900
id.iit.edu

Since its founding as the New Bauhaus in 1937, the Institute of Design has grown into the largest full-time graduate-only design program in the U.S. with students from around the world. The school offers a professional Master of Design degree program with areas of study in communication design, interaction design, product design, strategic design, systems thinking, and user research; a dual Master of Design/M.B.A. degree program in partnership with the Stuart School of Business; the Master of Design Methods, a nine-month program for mid-career professionals; and a Ph.D. in Design. The Institute of Design created the country's first Ph.D. design program in 1991.

Reserve Officers Training Corps (ROTC)

All branches of the United States military are represented at Illinois Institute of Technology. The U.S. Air Force and U.S. Navy are headquartered at Illinois Institute of Technology; the U.S. Army is based at a partner university, but has an on-campus office as well. All three branches serve the entire Chicago area.

ROTC: Air Force Aerospace Studies

AFROTC Detachment 195
10 W. 35th St.
Chicago IL 60616
312.567.3526
afrotc.iit.edu

Chair
Lt. Col. Michael L. Aul

The mission of Air Force Reserve Officer Training Corps (AFROTC) is to develop quality leaders for the Air Force. Students who become cadets have the opportunity to earn a commission in the United States Air Force while earning their baccalaureate or graduate degree. Most graduates who enter the Air Force through this program are assigned to positions consistent with their academic majors, but the needs of the Air Force do come first. Highly qualified, interested graduates may compete for selection as pilots, remotely piloted aircraft pilots, and navigators, usually in their AS 300 year.

Air Force ROTC students gain an understanding of air and space fundamental concepts and principles, and a basic understanding of associated professional knowledge. Students develop a strong sense of personal integrity, honor, and individual responsibility, and an appreciation of the requirements for national security.

Faculty

Professor
M. Aul

Assistant Professors
N. Recker, J. Sterr, J. Sacks

Financial Aid

The Air Force ROTC High School Scholarship Program (HSSP) offers four-year and three-year scholarships for highly qualified high school graduates interested in an Air Force career. Additionally, the In-College Scholarship Program (ICSP) offers a variety of scholarships to qualified students already enrolled in college. Interested students can learn more about scholarship opportunities at the Air Force ROTC website or may contact Detachment 195 at 312.567.3526.

Minors

Students may select a minor in Air Force Aerospace Studies. For course requirements, see the Program Requirements section (p. 318).

Four-Year Program

The four-year program consists of a two-year General Military Course (GMC) and a two-year Professional Officer Course (POC). Students normally start this program in their freshman year. Qualified students with previous service or at least three years Air Force JROTC may start as sophomores and enroll directly in the AS 200 course. Any student who is not on an AFROTC scholarship may withdraw from the GMC at any time. Students selected for POC must complete an AFROTC sponsored 12-day field training encampment at an Air Force base before being awarded POC status and stipends (pay). This requirement is normally fulfilled the summer after completing the sophomore year and before beginning the junior year. The major areas of study during field training include junior officer training, career orientation, base functions, and the Air Force environment.

Three-Year Program

The three-year program consists of a one-year condensed GMC and a two year POC. Participants in this program are selected from qualified volunteer applicants. The program is designed for students with fewer than four, but at least three years remaining. The major areas of study are the same as those in the four-year program with the condensed GMC academic curriculum.

Required Courses

Code	Title	Credit Hours
AS 101	Heritage and Values of USAF I	1
AS 102	Heritage and Values of USAF II	1
AS 201	Team & Leadership Fund I	1
AS 202	Team & Leadership Fund II	1
AS 301	Lead People/Effective Comm I	3
AS 302	Lead People/Effective Comm II	3
AS 401	National Security Affairs	3
AS 402	Preparation for Active Duty	3
Total Credit Hours		16

ROTC Air Force Aerospace Studies Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
AS 101	1	AS 102	1
	1		1
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
AS 201	1	AS 202	1
	1		1
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
AS 301	3	AS 302	3
	3		3
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
AS 401	3	AS 402	3
	3		3

Total Credit Hours: 16

ROTC: Military Science

IIT Tower,15th Floor, Suite 15D9-1
Chicago, IL 60616
312.808.7140
web.iit.edu/rotc

Chair
LTC Araya Rutnarak

Illinois Institute of Technology Program Director
MAJ Charles Cain

Assistant Program Director
SFC Howard Clifford

The principal objective of the college-level Reserve Officers' Training Corps (ROTC) program is to develop commissioned officers for the Active Army, the Army National Guard, and U.S. Army Reserve. Each course is designed to develop essential qualities and traits of leadership required for success in either a civilian or a military career.

Instruction is offered through either a four-year, three-year, or two-year program. The four-year program consists of the Basic Course (freshman and sophomore years) and the Advanced Course (junior and senior years). The three-year program is similar to the four-year program but may require attendance at Cadet Summer Training Basic Camp. The two-year Advanced Course is open to students eligible for advanced placement through a variety of options, including master's degree programs, and may require attendance at Cadet Summer Training Basic Camp. All three programs include attendance at Cadet Summer Training Advanced Camp just prior to commissioning. Advanced Camp is typically completed between the junior and senior years but can be delayed to the end of the senior year in special circumstances.

Basic Course

The Basic Course is an introduction to military science and carries no military obligation. Completion is a prerequisite to enrollment in the Advanced Course. Prior service, completion of basic combat training through the National Guard or Reserve, or completion of Cadet Summer Training Basic Camp may be substituted for the Basic Course.

Advanced Course

All cadets who successfully complete the Basic Course, meet the physical and academic requirements, and pass a physical examination are eligible for selection by the professor of military science for the Advanced Course. A tax-free subsistence allowance of $425 per month is paid to each cadet in this advanced course (also available to those in the basic course that are receiving an Army Scholarship) except during attendance at Cadet Summer Training Basic/Advanced Camp, where pay is approximately $200 per week. Upon graduation and successful completion of Cadet Summer Training Advanced Camp and the Professional Military Education Requirements (PMEs), cadets are commissioned as second lieutenants in the Active Army, the Army Reserve, or the National Guard.

Professional Military Education Requirements (PMEs)

In order to receive a well-rounded education, cadets are required to complete courses in the following areas: advanced written communications, human behavior, military history, computer literacy, and math reasoning.

Simultaneous Membership Program (SMP)

Membership in the Army National Guard or United States Army Reserve offers cadets additional experience as officer trainees, and these individuals will receive both the ROTC stipend and drill pay as an E-5. They may also receive additional money while attending school through the Montgomery GI Bill and/or USAR Kickers.

Financial Assistance

In addition to a monthly stipend of $425 as an advance-course cadet, the program offers two-, three-, and four-year federal Army ROTC scholarships for full tuition to qualified students. The university offers an excellent incentive package to scholarship winners such as room and board for certain scholarships. For further information, students should call 312.808.7140 or visit the Department of Military Science in IIT Tower, 15th Floor, Suite 15D9-1.

Required Courses

Code	Title	Credit Hours
MILS 101	MILS Intro & Critical Thinking	1
MILS 102	Basic Leadership	1
MILS 201	Individual Leadership STUDS	2
MILS 202	Leadership and Teamwork	2
or MILS 107	American Military History	
MILS 301	Leadership&PRBLM SLVNG	3
MILS 302	Leadership and Ethics	3
MILS 401	Leadership&Management	3
MILS 402	Officership	3
Total Credit Hours		18

MILS 147, MILS 148, MILS 247, and MILS 248 (Aerobic Conditioning) are required for all cadets in the Basic Program. The preceding four courses and MILS 347, MILS 348, MILS 447, and MILS 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

ROTC: Military Science Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
MILS 101	1	MILS 102	1
MILS 147[1]	2	MILS 148[1]	2
	3		3
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
MILS 201	2	MILS 202	2
MILS 247[1]	2	MILS 248[1]	2
	4		4
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
MILS 301	3	MILS 302	3
MILS 347[2]	2	MILS 348[2]	2
	5		5
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
MILS 401	3	MILS 402	3
MILS 447[2]	2	MILS 448[2]	2
	5		5

Total Credit Hours: 34

1 MILS 147, MILS 148, MILS 247, and MILS 248 (Aerobic Conditioning) are required for all scholarship cadets in the Basic Program.

2 MILS 347, MILS 348, MILS 447, and MILS 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

ROTC: Naval Science

10 W. 35th Street
15th Floor
Chicago, IL 60616
312.567.8963
nrotc@iit.edu
iit.edu/nrotc

Chair
CAPT Christopher Adams, USN

The Naval Reserve Officers Training Corps (NROTC) offers an opportunity for young men and women to qualify for a commission in the U.S. Navy or U.S. Marine Corps while attending college. While pursuing their academic studies, midshipmen of the NROTC receive a professional education and the necessary specialized training to qualify them to become commissioned Navy or Marine Corps officers.

As commissioned officers in the United States Navy, graduates may serve in one of the various components of the U.S. Fleet, such as surface ships, the aviation community, or nuclear-powered submarines. Of particular interest is the opportunity to serve as an operating engineer aboard a nuclear or conventionally powered ship. The theoretical knowledge obtained at Illinois Institute of Technology is combined with practical knowledge and early responsibility in the operation and management of the latest in missile, aircraft, and high-performance ship propulsion systems.

Students may request the option to become officers in the U.S. Marine Corps. A commission in the Marine Corps may lead to a specialization in aviation, infantry, engineering, armor, communications, or supply.

Faculty

Professor
CAPT C. W. Adams, USN

Associate Professor
CDR M. F. Gray, USN

Assistant Professors
LT V. M. Fontana, USN
LT J. N. Smith, USN
CAPT A. M. North, USMC

ROTC: Naval Science Undergraduate Study

The Illinois Institute of Technology Naval Reserve Officers Training Corps (NROTC) Unit was established in 1946 by congressional authorization to create a Naval Science department. The Professor of Naval Science (PNS) chairs Illinois Institute of Technology's Department of Naval Science. Department faculty members are commissioned officers serving on active duty in the United States Navy or Marine Corps. They are selected and nominated by their respective services and screened and approved by the university.

Naval ROTC Programs

The Naval Reserve Officers Training Corps offers young men and women the opportunity to obtain leadership and management experience as commissioned officers in the United States Navy (Navy option) or Marine Corps after graduation from Illinois Institute of Technology, through either the Scholarship Program or the non-scholarship College Program.

At Illinois Institute of Technology, NROTC midshipmen lead essentially the same campus life as other students. They participate in campus activities of their choice and can participate in work-study programs including university-sponsored overseas study.

There are no prescribed academic majors for NROTC students, although scientific and technical studies are encouraged. NROTC students are required to complete the naval science curriculum, attend a weekly two-hour laboratory, and participate in four to six weeks of active duty for summer training at sea or ashore. Additionally, NROTC students will participate in physical training at least once a week, and will have the opportunity to travel with the unit drill team to regional competitions. College Program students attend training during the summer preceding their last academic year. Between their third and fourth years, Marine Corps NROTC students will attend a summer training program at the Marine Corps development and Education Command in Quantico, VA.

Scholarship Program

NROTC scholarship students are selected by nationwide competition. The NROTC Scholarship pays for tuition, books, and fees, as well as providing a tax-free stipend each month for four years. Graduates are commissioned as naval or marine corps officers and incur a minimum obligation of four years of active duty service.

College Program

Admission to the College Program is controlled by the Professor of Naval Science. Students incur no obligation to the naval services for participation in this program until their junior year. Qualified students enrolled in this program may be recommended for scholarships by the Professor of Naval Science. In addition to uniforms and some naval science books issued to students enrolled in this program, the Navy provides a tax-free stipend each month during the junior and senior years. Graduates are commissioned as Reserve naval officers and incur a minimum obligation of three years of active duty.

Two-Year Programs

The Navy/Marine Corps offer two two-year programs; one of these is a Scholarship Program and the other is a two-year College Program. Students are selected before April 1 of their sophomore year and attend a six-week Naval Science Institute Course at Newport, RI in the summer before entering their junior year. Scholarship benefits for the junior and senior year are identical to those received by students in the four-year scholarship program during their junior and senior years.

Academic Requirements

Scholarship Program students are encouraged to pursue majors in engineering and applied sciences to meet the technological demands of the modern Navy. Most other fields of study leading to a baccalaureate degree are permitted with the approval of the Professor of Naval Science. All Navy option scholarship program students are required to complete one year each of calculus and physics.

College Program students and students enrolled in the Marine Corps option are encouraged to take courses in calculus and physics or to pursue a science or engineering major. In addition to the prescribed naval professional academic courses, the naval faculty conducts laboratories all four academic years to give students experience in practical leadership.

All scholarship students are required to complete a course in American Military Affairs or National Security Policy and complete a cultural studies course. Naval science courses are not offered on a pass-fail basis.

Optional Program

Students may select a minor in naval science. Course requirements can be found in the Sample Curriculum section (p. 323).

Required Courses

Code	Title	Credit Hours
NS 101	INTRO to Naval Science	2
NS 102	Naval Ships Systems I (Navy option)	3
NS 201	Naval Ships Systems II (Navy option)	3
NS 202	Seapower&Maritime Affairs	3
NS 301	Navigation (Navy option)	3
NS 302	Naval Operations & Seamanship (Navy option)	3
NS 401	Leadership and Management	3
NS 402	Naval Leadership and Ethics	3
Total Credit Hours		23

Attendance at the Naval Science Institute may be substituted for NS 101, NS 102, NS 201, and NS 202. NS 497 (zero credit hours) is required every semester.

ROTC: Naval Science Curriculum

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
NS 101	2	NS 202	3
	2		3
			Year 2
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
NS 401	3	NS 301	3
	3		3
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
NS 102	3	NS 201	3
	3		3
			Year 4
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
NS 302	3	NS 402	3
	3		3

Total Credit Hours: 23

Marine Option

			Year 1
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
NS 101	2	NS 202	3
	2		3
			Year 2
Semester 1	**Credit Hours**		
NS 401	3		
	3		
			Year 3
Semester 1	**Credit Hours**	**Semester 2**	**Credit Hours**
NS 310	3	NS 410	3
	3		3
			Year 4
		Semester 2	**Credit Hours**
		NS 402	3
	3		

Total Credit Hours: 17

Undergraduate Courses A-Z

ILLINOIS TECH, IN ITS SOLE DISCRETION, RESERVES THE RIGHT, WITHOUT PRIOR NOTICE OR CONSULTATION OR CONSIDERATION OR LIABILITY OF ANY KIND, TO PROVIDE AND/OR TO CHANGE THE MEANS OF INSTRUCTION FOR THE COURSES LISTED BELOW, WHICH MAY INCLUDE, BUT ARE NOT LIMITED TO, IN-PERSON, ONLINE, AND/OR A COMBINATION OF SUCH MEANS, AND TO MAKE ADJUSTMENTS TO THE SAME DURING THE COURSE OF A SEMESTER. REGARDLESS OF THE MEANS OF INSTRUCTION AND/OR ANY CHANGES THERETO, COURSES SHALL CONTINUE TO HAVE THE CREDIT HOURS IN THE AMOUNT NOTED HEREIN.

Air Force Aerospace Studies (AS)

AS 101
Heritage and Values of the United States Air Force I
This survey course is designed to introduce students to the United States Air Force and provides an overview of the basic characteristics, missions, and organization of the Air Force. This is the first course of a two-course sequence that continues with AS 102 Heritage and Values of the United States Air Force II.
Corequisite(s): AS 499
Lecture: 1 **Lab:** 0 **Credits:** 1
Satisfies: Communications (C)

AS 102
Heritage and Values of the United States Air Force II
This survey course is designed to introduce students to the United States Air Force and provides an overview of the basic characteristics, missions, and organization of the Air Force. This is the second course of a two-course sequence that begins with AS 101 Heritage and Values of the United States Air Force I.
Corequisite(s): AS 499
Prerequisite(s): AS 101
Lecture: 1 **Lab:** 0 **Credits:** 1
Satisfies: Communications (C)

AS 201
Team and Leadership Fundamentals I
This course focuses on laying the foundation for teams and leadership. The topics include skills that will allow cadets to improve their leadership on a personal level and within a team. The courses will prepare cadets for their field training experience where they will be able to put the concepts learned into practice. The purpose is to instill a leadership mindset and to motivate sophomore students to transition from AFROTC cadet to AFROTC officer candidate. This is the first course of a two-course sequence that continues with AS 202 Team and Leadership Fundamentals II.
Corequisite(s): AS 499
Prerequisite(s): AS 102
Lecture: 1 **Lab:** 0 **Credits:** 1
Satisfies: Communications (C)

AS 202
Team and Leadership Fundamentals II
This course focuses on laying the foundation for teams and leadership. The topics include skills that will allow cadets to improve their leadership on a personal level and within a team. The courses will prepare cadets for their field training experience where they will be able to put the concepts learned into practice. The purpose is to instill a leadership mindset and to motivate sophomore students to transition from AFROTC cadet to AFROTC officer candidate. This is the second course of a two-course sequence that begins with AS 201 Team and Leadership Fundamentals I.
Corequisite(s): AS 499
Prerequisite(s): AS 201
Lecture: 1 **Lab:** 0 **Credits:** 1
Satisfies: Communications (C)

AS 301
Leading People and Effective Communication I
This course teaches cadets advanced skills and knowledge in management and leadership. Special emphasis is placed on enhancing leadership skills and communication. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors. This is the first course of a two-course sequence that continues with AS 302 Leading People and Effective Communication II.
Corequisite(s): AS 499
Prerequisite(s): AS 101 and AS 202 and AS 201 and AS 102
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

AS 302
Leading People and Effective Communication II
This course teaches cadets advanced skills and knowledge in management and leadership. Special emphasis is placed on enhancing leadership skills and communication. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors. This is the second course of a two-course sequence that begins with AS 301 Leading People and Effective Communication I.
Corequisite(s): AS 499
Prerequisite(s): AS 301
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

AS 401
National Security Affairs
This course is designed for college seniors and gives them the foundation to understand their role as military officers in American society. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level. This is the first course of a two-course sequence that continues with AS 402 National Security Affairs/Preparation for Active Duty II.
Corequisite(s): AS 499
Prerequisite(s): AS 302
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

AS 402
National Security Affairs/Preparation for Active Duty II
This course is designed for college seniors and gives them the foundation to understand their role as military officers in American society. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level. This is the second course of a two-course sequence that begins with AS 401 National Security Affairs/Preparation for Active Duty I.
Prerequisite(s): AS 401
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

AS 499
AFROTC LLAB Leadership Laboratory
Leadership Laboratory (LLAB) is a dynamic and integrated grouping of leadership developmental activities designed to meet the needs and expectations of prospective Air Force second lieutenants and complement the AFROTC academic program. Most of the LLAB lesson objectives are cadet planned, organized, and executed under the supervision of the Detachment Commander and Operations Flight Commander. LLAB is required every Fall and Spring semester for Air Force cadets.
Lecture: 0 **Lab:** 3 **Credits:** 0

Architecture (ARCH)

ARCH 100
Introduction to Architecture
Orientation to contemporary local architecture practice in the context of the history of architectural theory; examination of the changing role of the architect through history; introduction to the formal language and vocabulary of the discipline. Emphasis given to developing written and presentations skills.
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

ARCH 107
Design Communications I: Units and Order
A comparative study of physical and digital media from the immediacy of the hand to the logical rigor of algorithmic design. Organizational systems and mapping strategies are explored as craft is developed across a broad toolkit. Instruction in object-oriented thinking begins an introduction to computer science.
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 108
Design Communications II: Systems and Assemblages
The full design communication process, from contextual + programmatic analysis to the digital fabrication of a system of parts, will be introduced through a series of related studies. Computationally associative design methodologies will be utilized and continue the computer science introduction.
Prerequisite(s): ARCH 107
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 113
Architecture Studio I: Elements
Introduction of architecture through the design of architectonic elements -- walls, doors, stairs, rooms, etc. Students explore the relationship between the human body and the built environment and learn fundamentals of composition, design process, representation, research, craftsmanship, graphic and verbal communication, and analytical thinking.
Lecture: 0 **Lab:** 12 **Credits:** 6
Satisfies: Communications (C)

ARCH 114
Architecture Studio II: Unit
As an extension of the themes of ARCH 113, students explore the synthesis of architectural elements in the design of an integrated architectonic unit comprised of architectural elements. Students are introduced to urban research and further develop their skills of analytical thinking, representation, and design communication.
Prerequisite(s): ARCH 107 and ARCH 113 and ARCH 108*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 12 **Credits:** 6
Satisfies: Communications (C)

ARCH 201
Architecture Studio III: House
Continued development of architectural principles of ARCH 114 through the design of a house in the city and the study of dwelling precedents. Students are introduced to the concepts of programming, urban design, and the technical aspects of construction assemblies and further develop their understanding of design process and their skills in design communication and critical thinking.
Prerequisite(s): ARCH 113 and ARCH 108 and ARCH 114
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 202
Architecture Studio IV: Multiple
Continued development of architectural principles of ARCH 201 through research and design of multi-unit housing in the city. Students further their understanding of programming, urban design and the technical aspects of construction assemblies. The study of architectural scale, composition and urban relationships are explored. Development of design process and skills of design communication and critical thinking are furthered.
Prerequisite(s): ARCH 113 and ARCH 201 and ARCH 114
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 207
Design Communications III: Analysis and Exposure
Introduction to geospatial mapping, data modeling, and data visualization processes for research, analytics, and generative design. Basic data structures, algorithms, and design patterns advance students ability to construct digital tools and communicate complexity.
Prerequisite(s): ARCH 108 and ARCH 107
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 208
Design Communications IV: Interaction and Immersion
Introduction to immersive, mixed media, and mixed reality experience design and physical interactivity for hybrid media practices for the built environment.
Prerequisite(s): ARCH 107 and ARCH 207 and ARCH 108
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 215
Site Design, Planning, and Ecology
Introduction to the fundamentals of site design and the analysis of topography, soils, climate, solar, wind, thermodynamics, water management, trees/vegetation, and accessibility as environmental design factors. Course format includes lectures, site visits, and workshops to develop a better understanding of the complex relationship between building and landscape.
Prerequisite(s): ARCH 107 and ARCH 114 and ARCH 113 and ARCH 108
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 230
Systems: Structural Analysis
The course will provide the student with an understanding of basic structural behavior. It will teach students about forces, vectors, equilibrium, statics, free body diagrams, material properties, stress, strain and deformation. It will look at the concepts of loads takedown and tributary area. Part of that discussion will be the concept of diaphragms (flexible vs. rigid) as a way of distributing horizontal loads to the lateral resisting systems.
Prerequisite(s): PHYS 200 or PHYS 123 or (PHYS 211 and PHYS 212)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

ARCH 305
Architecture Studio V: Hybrid
Continued development of architectural principles of ARCH 202 through research and design of a project of hybrid program in the city. Students further their understanding of programming, urban design and the technical aspects of construction assemblies. The study of architectural and urban space, site and context, building composition and urban relationships are explored. Development of design process and skills of design communication and critical thinking are furthered.
Prerequisite(s): ARCH 201 and ARCH 230 and ARCH 202
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 306
Architecture Studio VI: Hybrid
Continued development of architectural principles of ARCH 305 through the design of an urban neighborhood project. Students are introduced to urban design and larger scale planning issues and conduct broad-based research into issues impacting larger mixed-use buildings in the city.
Prerequisite(s): ARCH 201 and ARCH 230 and ARCH 305 and ARCH 202
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 321
Contemporary Architecture
This course investigates the state of contemporary architecture as represented by significant practices, buildings, theories, and criticisms. Themes to be considered include globalization, the role of digital design media, the ethics and aesthetics of sustainability, contemporary urbanism, new approaches to materials and structure, and recent interests in ornament and pattern-making. Current conditions will be related historically to postwar reactions to modernism and contextually to the social and technological shifts of recent decades.
Prerequisite(s): AAH 120 and AAH 119
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ARCH 331
Visual Training I
Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 332
Visual Training II
Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.
Prerequisite(s): ARCH 331
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 333
Visual Training III
Spatial studies with planes and volumes of various materials. Aesthetic expression as experience. Exercises in the study of form: proportion and rhythm, texture and color, mass and space. Exercises in visual perception and aesthetic judgment. Isolation and analysis; interdependence and integration of sensuous qualities. Aesthetic unity under restrictive conditions.
Prerequisite(s): ARCH 332 and ARCH 331
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 334
Material: Metal
A comprehensive investigation of steel building design viewed through material properties, structural members, and structural systems. The focus of the class will be the understanding and reduction of complex steel building concepts into understandable components of the detail, the element, and the system. Topics include flexural members, compression members, tension members, lateral and gravity systems, and connections. Current and historical precedents will be presented in case studies and building tours.
Prerequisite(s): ARCH 230 and (PHYS 123 or PHYS 200)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

ARCH 335
Material: Cementitious
A comprehensive investigation of concrete building design viewed through material properties, structural members, and structural systems. The focus of the class is the understanding and reduction of complex concrete building concepts into understandable components of the detail, the element and the system. Topics include flexural members, compression members, geotechnical engineering, foundation systems, lateral and gravity systems, connections, and detailed technical drawings. Current and historical precedents will be presented in case studies and building tours.
Prerequisite(s): ARCH 230 and ARCH 334 and (PHYS 123 or PHYS 200)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

ARCH 403
Environment and Building Systems I
Selection and design of building support systems: heating, ventilating, air conditioning, water supply, sanitary and storm drainage, power distribution, lighting, communications and vertical transportation. Systems are analyzed for their effect on building form, construction cost and operating efficiency.
Prerequisite(s): ARCH 201 and ARCH 202
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 404
Environment and Building Systems II
Selection and design of building support systems: heating, ventilating, air conditioning, water supply, sanitary and storm drainage, power distribution, lighting, communications, and vertical transportation. Systems are analyzed for their effect on building form, construction cost and operating efficiency.
Prerequisite(s): ARCH 403
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 413
Architectural Practice
Lectures and practical problems dealing with specifications, specification writing, administration of construction, contracts, building law and professional practice.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 414
Professional Practice: Building Case Studies
Case study analysis of buildings, including the design process, building detailing, construction methods, government regulation, owner satisfaction, and post-construction forensics.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ARCH 417
Architecture Studio VII: Synthesis
This course introduces students to technical aspects of building design through a Comprehensive Building Design project focusing on an institutional building in the city. Building on previous design studios, students continue their investigation into urban and cultural research, and are introduced to building systems and concepts of building performance, sustainability and building envelope design. The integration of mechanical, electrical, plumbing systems, structural systems, constructional assemblies, and technology systems is addressed in lectures and studio work, and students are introduced to advanced tools related to building performance and evaluation software.
Prerequisite(s): ARCH 230 and ARCH 404 and ARCH 403 and ARCH 335 and ARCH 334 and ARCH 306
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 418
Architecture Studio VIII: Synthesis
This course continues and furthers the student's understanding of the technical aspects of building design through a Comprehensive Building Design project focusing on an institutional building in the city with a complex program. Building on previous design studios, students continue their investigation into urban, programmatic and cultural research, and further their knowledge of building systems and concepts of building performance, sustainability and building envelope design. The integration of mechanical, electrical, plumbing systems, structural systems, constructional assemblies, and technology systems is addressed in lectures and studio work, and students further their understanding of advanced tools related to building performance and evaluation software.
Prerequisite(s): ARCH 230 and ARCH 334 and ARCH 404 and ARCH 403 and ARCH 417 and ARCH 335
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 419
Architecture Studio IX: Advanced
Advanced Studios engage both IIT architecture faculty and a select group of visiting studio professors noted for their outstanding professional experience in contemporary practice. The focus of each studio is strong design experimentation that is implemented in highly resolved, complex architectural design projects. Studios work on sites within Chicago, explore urban areas around the globe, and/or focus on hypothetical or technological challenges that shape the built environment. Students design structural and material systems that recognize issues of ecology as well as the broader, integrated concerns of climate, energy and natural resource use, and sustainability. Uniting the diverse strands of urban place making, economic diversity, social equity and environmental stewardship, Advanced Studios promote the design of places that reflect the values of their inhabitants, and create a lasting sense of community with meaningful identity. The studios are formed in thematic clusters that complement each other or serve as dialectical opposites. Each studio explores a variety of techniques from parametric design, digital fabrication, model making, and advanced geospatial software to cultural and theoretical explorations. Students will be able to select from a variety of studio topics. The vertical studio integrates advanced BArch, MArch, MS, and PHD students. Open only to Architecture majors.
Prerequisite(s): ARCH 230 and ARCH 335 and ARCH 334 and ARCH 417 and ARCH 418 and ARCH 403 and ARCH 404
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 420
Architecture Studio X: Advanced
Advanced Studios engage both IIT architecture faculty and a select group of visiting studio professors noted for their outstanding professional experience in contemporary practice. The focus of each studio is strong design experimentation that is implemented in highly resolved, complex architectural design projects. Studios work on sites within Chicago, explore urban areas around the globe, and/or focus on hypothetical or technological challenges that shape the built environment. Students design structural and material systems that recognize issues of ecology as well as the broader, integrated concerns of climate, energy and natural resource use, and sustainability. Uniting the diverse strands of urban place making, economic diversity, social equity and environmental stewardship, Advanced Studios promote the design of places that reflect the values of their inhabitants, and create a lasting sense of community with meaningful identity. The studios are formed in thematic clusters that complement each other or serve as dialectical opposites. Each studio explores a variety of techniques from parametric design, digital fabrication, model making, and advanced geospatial software to cultural and theoretical explorations. Students will be able to select from a variety of studio topics. The vertical studio integrates advanced BArch, MArch, MS, and PHD students. Open only to Architecture majors.
Prerequisite(s): ARCH 230 and ARCH 334 and ARCH 335 and ARCH 417 and ARCH 418 and ARCH 403 and ARCH 404
Lecture: 0 **Lab:** 12 **Credits:** 6

ARCH 421
Basics of Building Simulation in the Built Environment I
This course aims to provide students with an understanding of principles, methods and applications of energy and carbon analysis at both building and urban scales, through weekly lectures and hands-on simulation software tutorials.
Prerequisite(s): ARCH 335 or ARCH 514 with min. grade of C
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 422
Basics of Building Simulation in the Built Environment II
The application of energy conservation methods and renewable energy sources, such as wind power and passive solar systems, will be examined in the development of building energy budgets for a variety of building types.
Prerequisite(s): ARCH 421
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 423
Architectural Programming
Study of the principles of problem definition, problem solving, and decision making in the process of design. Specific research methods are reviewed, including those with computer-aided data collection potential. Coursework includes: identification of client/project requirements and constraints; development of a building/project program; cost analysis; development of relevant design options; and presentation skills and development.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ARCH 429
Digital Form Generation
Introduction to the development of algorithmic design methods, a basis for computational thinking. Review programming in CAD systems, programming basics in AutoCAD, extensive creation of 2D and 3D architectural forms, wall patterns, CAD data interrogation, manipulation, and extraction. Introduction to 2D and 3D parametric and rule-based design. Investigation of form creation based on a variety of mathematical relationships including random generation and form generation based on collected data values including images. Also included is a review of CAD database procedures for space planning and bill of quantities. Includes methods for creating models for the purpose of fabrication including CNC and rapid prototyping.
Prerequisite(s): (ARCH 125 and ARCH 226 and ARCH 427) or ARCH 428
Lecture: 2 **Lab:** 2 **Credits:** 3

ARCH 431
Visual Training I
This elective comprises several topics. They include traditional media, e.g. sculpture, collage or free-hand drawing, digital prototyping, exhibition design, digital media production, architectural lighting, interior design, etc. The course provides students the opportunity to pursue individual paths in order to synthesize skills acquired in the previous visual training segments of the curriculum.
Prerequisite(s): ARCH 507 with min. grade of C and ARCH 506 with min. grade of C
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 432
Visual Training II
This elective comprises several topics. They include traditional media, e.g. sculpture, collage or free-hand drawing, digital prototyping, exhibition design, digital media production, architectural lighting, interior design, etc. The course provides students the opportunity to pursue individual paths in order to synthesize skills acquired in the previous visual training segments of the curriculum.
Prerequisite(s): ARCH 507 with min. grade of C and ARCH 506 with min. grade of C
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 433
Introduction to Digital Fabrication
This course offers a comprehensive exploration of computer-aided fabrication from concept development and modeling through digital file creation and cutting processes. Using CAD/CAM software, laser cutters, CNC mills, and 3D printers, students with a variety of interests can build the elements of detailed models, fabricate a range of finished objects, or even create landscapes incorporating highly articulated surfaces. The course stresses the integration of the complete thought process from concept development to pre-visualization to detailed modeling to fabrication setup and finishing. Students gain a solid understanding of the rapidly developing world of CAD/CAM techniques while acquiring specific long-term skills in software-based modeling and machine-assisted fabrication.
Prerequisite(s): ARCH 207 or ARCH 508
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 434
Advanced Building Information Modeling Strategies
Students work on research topics related to the intersection of machine learning, artificial intelligence, and building information modeling. We are exploring topics related to neural networks, natural language processing and other advanced computer science topics. The course attempts to ask the question of what should architects and designers be doing with the wealth of data that is defined during the design and construction process.
Prerequisite(s): ARCH 207 or ARCH 508
Lecture: 0 **Lab:** 3 **Credits:** 3

ARCH 435
Digital Fabrication
This course explores the design and fabrication of components in contemporary practice. The class will investigate through the design and prototyping of a custom component. Survey of CAD/CAM/GIS use in practice and component manufacturing including modeling, simulation, and scripting. Behavioral models of components using simulation and analysis tools (flow, system dynamics, etc.). Use of CAD tools to model components for production (modeling for CNC considering toolpaths and jigs). Use of CAD tools to analyze properties of components. Material properties and related fabrication constraints. Current fabrication processes. Use of IIT-owned CNC tools to fabricate components. Rapid prototyping.
Prerequisite(s): ARCH 433
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 436
Advanced Modeling
This course will focus on 3D modeling of complex geometric components in architecture and design. Concepts explored will concentrate on the advancement of digital design as an iterative process. Various modeling types covered are (1) Explicit Modeling, (2) Nurbs Surface Modeling, (3) Parametric Modeling, and (4) Generative Components and Response Modeling. Output will utilize digital fabrication methods as support of the iterative design process.
Prerequisite(s): ARCH 207 or ARCH 508
Lecture: 0 **Lab:** 3 **Credits:** 3

ARCH 438
Design Visualization
This course is an in-depth exploration of new visualization techniques to support and express architectural design through 3D rendering. Topics covered will include 3D modeling, cameras, lighting, material mapping, and rendering output. Presentation concepts covered include storytelling, rendering style, visual mood, and image composition.
Prerequisite(s): ARCH 207 or ARCH 508
Lecture: 1 **Lab:** 3 **Credits:** 3

ARCH 440
Pure Form
The concept of pure form resides in the abstract in their ideal state the forms are perfect. Material properties inherently defy perfection and force a set of priorities and decisions that render the proximity of an ideal while providing a sensual experience. The study of the relationship between ideas, form and physical making integral to the production process, through repetition and variation. Production of a cohesive body of investigative work of a single pure form.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 441
Collage Making
Collage, the act of bringing together disparate materials and imagery, has the opportunity to explore unknowns, exploit the peculiar, and reveal the uncanny. Collage operates within a contemporary context of mass-production, mass media, and mass consumption. Mash ups, cut ups, power mixing, and sampling are artistic methods of repurposing products made by others. Collage Making explores the iterative process of collection/selection/arrangement and execution. Collages produced will examine architecture in contemporary culture.
Prerequisite(s): ARCH 107 or ARCH 506
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 445
The Prairie School
This significant Midwestern style of architectural and landscape design evolved from social reform and nationalist tendencies but also from the beginnings of ecology and modern design. This course focuses on the work of Prairie School architects and landscape architects such as Frank Lloyd Wright, Walter Burley Griffin, Jens Jensen, and IIT's Alfred Caldwell. Field trips explore the evolution of 19th century Romantic Styles into Prairie School designs, ending with 20th century modernism and organic architecture. The collaboration between planners, architects, landscape architects, and craftspeople will be explored throughout the course.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 446
History of Landscape Architecture
Survey of the history of landscape design throughout the world, including contemporary projects. The course emphasizes both analytical and holistic approaches to the study of historic designs, highlights the relationship between architecture and landscape, and stresses major concepts that directly influence present day designs. One field trip.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 447
Architecture and Furniture
Individually or in small groups, students will design and fabricate furniture as part of a collectively developed master plan. Students explore historic and contemporary furniture design, theory, materials, and fabrication techniques. Lectures and discussions will focus on the relationship between architecture and furniture in its 500-year history, the design process, fabrication technologies and techniques, drawing and modeling as a means of exploration, representation, presentation, and fabrication. Labs will allow students the opportunity to experience in a semester the traditional sequence of master plan, schematic design, design development, construction drawings, fabrication, and use.
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 448
Topics in Furniture Design/Build
This topics course will introduce students to the use of traditional furniture building techniques including the use of hand and power tools. Students will investigate furniture built of solid wood, composite wood, plastics, and metals and learn to build furniture with a limited number of basic tools and on a budget. A series of exercises will train students to do the physical connection; a series of lectures and presentations will show production and finishing techniques.
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 449
Alternative Chairs
This course will be about the design of chairs, or more broadly body support devices, and the focus will be on ergonomics, structure, materials, and manufacturing issues. If a house can be considered a "machine for living", this will be about machines for the support of the body. The course will conclude with each student building a prototype chair of his or her own design.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 454
Contemporary Chicago Architecture: Case Studies
Contemporary architecture and urban design projects in Chicago present an invaluable opportunity to learn about some of the most advanced applications in practice today. By examining significant projects currently underway, this course will investigate project execution, design concepts and the various forces affecting projects' definition and results. Close scrutiny of all the components and personnel will give a better understanding of the complex synergies, advanced technologies, and adept project teams necessary for successful innovative architecture and urban planning.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 456
Topics in Modernism
This class is devoted to the close observation, description, and analysis of works of architecture from 1900 to the present. We will read exemplary texts of architectural criticism and history. Conducted as a seminar, this course studies writings and buildings through research papers, presentations, and other projects.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 460
Integrated Building Delivery Practice/BIM
Architecture has always been a complex interdisciplinary business, where the management of allied professions and industry affiliates is critical to the success of any endeavor of significant scale. The introduction of BIM (Building Information Modeling) is an advance in project delivery tools which should be viewed as a multi-dimensional expansion of the mechanisms of management and accommodation of an ever-broadening range of participants in the organization of a project, allowing the development of a new delivery protocol, IBPD (Integrated Building Project Delivery). BIM is currently recognized as consolidating the basis for a range of functions including drawing, modeling, document management, clash detection, interdisciplinary coordination, estimating, scheduling, constructability review, production modularization, fabrication protocols, and for the analysis of myriad physical and proscriptive demands such as energy consumption, daylighting, code compliance, egress, circulation, and operation scenarios. The breadth of information embedded in a BIM model will require the emergence of facilitating professionals to an extent previously unknown in the practice and the industry. This course explores the state of the profession and the anticipated ramifications. Undergraduate students must be in their fifth year of study.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 461
Entrepreneurship and Innovation in Architecture
The course teaches future architects the practical aspects of entrepreneurial small business management, to develop a comprehensive opportunity assessment, and to develop the skills necessary to improve the odds of success. The course will consider strategies to leverage limited resources for maximum effect. The course will also cover small organization and group behavior, performance, leadership, and motivation in small business settings and will focus on the owner/manager as the principal success factor in the context of a small organization. Emphasis is placed on the circumstances and opportunities of the professional practice of architecture: practice as profession, process, organization, business, and evolving models of practice are covered. The course also provides a series of concepts, frameworks, and heuristics that enable the entrepreneur to anticipate and deal with the challenges that accompany growth of an existing business. Cases, exercises, lectures, and speakers are used to focus on choosing opportunities, allocating resources, motivating employees, and maintaining control while not stifling innovation. A key component of the course is how to sustain entrepreneurial thinking in mid-sized ventures as they continue to grow. Undergraduate students must be in their fifth year of study.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 462
Planning Law and Land Policy
Since the introduction of basic zoning laws to the numbers and complexity of ordinances attached to any land parcel have proliferated to include those addressing land use, development, density, environmental concerns both on and off site, aesthetic mandates, energy use, quality of life concerns, and infrastructure development, the growing understanding that comprehensive and integrated systems must be managed across property lines to effect sustainable planning and communities will accelerate the number of prescriptive and policy ordinances enforced at the development of a parcel. Many agencies have further created extra-legal linkages between approvals for land development and the provision of social and ideological benefits to the community. The impact on the profession of architecture of the panoply of planning options and governmental goals is the result that the navigation of the system of mandated design determinates is one of the initial and potentially most creative acts in the process of project delivery. Project designers must understand the ramifications and trade-offs inherent in the system, especially in any attempt to achieve the best use of any parcel of land and position the most appropriate built environment. Undergraduate students must be in their fifth year of study.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 463
Real Estate Development and Finance Fundamentals
The Art of the Deal, with the emphasis on Art, is a term best positioning the financial structuring behind any project. The ability of the project team leader in integrated practice to understand and appreciate the motivations and opportunities inherent in the initiation of the project will be essential in guiding team decisions and maintaining a leadership position. The understanding of the financial underpinnings of a project is of paramount importance to those intending to actually engage the process of initiating and effecting a construction activity. The sources, costs, and sequence of funding, budgeting, cash flow, incentives options, and tax ramifications regarding a project are to be addressed as component knowledge to an understanding of integrated project management. Undergraduate students must be in their fifth year of study.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 465
Construction and Project Management
The organization of deliverables from the multiple participants in a project plan, including estimating, quality control, value engineering, scheduling of work, conflict resolution, pay schedules, and project close-out and commissioning are essential to managing a building project. Many of these areas of endeavor are those most directly impacted by the developments addressed in Integrated Building Delivery Practice. This course will solidify the underpinnings and will amplify, where needed, the requisite understanding in these areas of the practice. The development of managerial skills requisite to the practice of this coordination and the basis of developing inter-professional relationships will be stressed throughout the incorporation of the technical methodologies.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 466
Entrepreneurial Design: Sector Studies/Case Studies
This course will be advanced as an independent study format. Each student will work independently to research a project option, or building type, and document the particular attributes of that case study which require specialized address. Case studies might be a particular business niche such as land sub-divisions, condo conversions, change of use conversions, or build-to-suit options. The studies might pursue particular building types, social initiatives, historic restoration strategies, or even unique construction typologies. Undergraduate students must be in their fifth year of study.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 467
Advanced Materials Workshop
This course is designed to involve students with the architectural craft of materials that can be applied to model and prototype construction. Included will be a product project of the student's own choosing.
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 468
Topics in Drawing From Travel
A drawing topics course that develops the perceptual and technical skills critical to drawing in the field. Particular emphasis will be placed on the freehand travel sketch and its capacity to evoke both the physicality and character of a place. Production of a comprehensive drawn record of travels in the form of a journal/ sketchbook is required. Various media will be explored.
Lecture: 0 **Lab:** 6 **Credits:** 3

ARCH 469
Urban Design in Europe
This seminar course will explore current notions of urbanity as observed in the built environment of some cities in Europe. Projects and discussions will complement the design work undertaken in the architecture design studio. Assignments will focus on documentation and analysis of the various daily patterns and rituals of habitation.
Requisite: European Study Program or Paris Program
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 470
Image City: Mediation of Space
This seminar surveys the interaction between media and the city from the 19th century to the present. Any consideration of contemporary urban issues must take into account the roles that media and information technologies play in our lives. Every space we encounter or create has to be considered mediated. Course work will include assigned readings, assigned screenings, and creative design problems related to the issues considered in class.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 471
Architectural Freehand Rendering
Utilizing site visits, lectures, presentations, and critiques, students will learn freehand sketching, perspective, and conceptual sketching to convey building spatial ideas. Conceptual and schematic analysis of site visits will teach students to represent existing spaces, environments, and buildings as well as various building materials. Students will rely on four media to quicken their drawing skills and visual analysis -- pencil, ink, pastel, and water color.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 473
Conflict and Time
This seminar employs comparative studies of other arts, in particular cinema, to illuminate architectural aesthetics and the creative process. It has a dual focus: it undertakes an introduction to film studies through the analysis of films and readings in film theory and aesthetics; at the same time, it will consider architectural concepts and artifacts. The aim is not primarily to study cinema nor to make a definitive conclusion about the congruence or divergence of architecture and cinema. The course intends to cultivate a way of seeing: to illuminate the relations between media, technology, geography, architecture, and ideology.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 475
Spatial Stories
This course will examine the spatial story as it appears in diverse media: short fiction, films, everyday discourse, architecture, etc. The coursework will consist of reading and writing assignments as well as the viewing of films and other visual artifacts. The course has two goals: to offer students the opportunity to improve their study and communication skills and to examine the social, cultural, and historical aspects of spatial practices such as architecture.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 476
Developed Surface
This course looks at models as operational and instrumental tools that assist an architect to control both the material and the meaningful. Acting as an advanced seminar and workshop, course sessions will juxtapose speculative model making with seminar discussion. Student work will be reviewed in direct relation to readings and short lectures on historical and theoretical precedents in art, architecture, and urban design. Field research will support speculative mapping and modeling systems. A project to support the studio will reconcile a conceptual interest with a technical one. (Paris Program)
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 478
Digital Photography
Equips students with a suite of photographic skills and strategies tailored to their work as architects. Cultivates a discursive practice by developing foundational technical competencies, building awareness of key precedents, and honing a critical perspective for reading photographic images. Topics covered include camera operation, composing, staging, lighting, post-processing, printing, editing, curating, and publishing. Field and studio assignments, case study research work, and conversations with practicing photographers.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 480
Materials and Construction
This course provides an overview of basic building materials and assemblies, how they are constructed, and the relationships between them. The objective is to introduce students to the range of material choices available to the designer, new materials and assemblies, and fundamental principles to guide design decisions. The course is organized according to the MasterFormat outline developed by the Construction Specifications Institute. Students will learn standards for writing specifications using a system of numbered categories to organize construction activities, products, and requirements into a standard order. Topics include pre-design issues, sites and foundations, concrete, masonry, metals, wood, plastics, thermal and moisture protection, glass, roofing systems, and conveying equipment.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 481
Materiality in Architecture
This course examines the topic of material culture in contemporary architecture, and explores the different approaches, ideas and philosophies associated with aspects of materiality in architecture through the investigation and discussion of case study projects by contemporary architects. Students are introduced to a variety of approaches to the topic since the dawn of the Modern Movement, and explore how different contemporary architects approach the idea of materiality in their work, through their words, thoughts and built work. Thematic topics related to materiality are also presented and discussed, including materiality and landscape, materiality and technology, and materiality and memory. The class format is a lecture presentation by the professor with student discussion. The course is an elective section of the History/Theory sequence.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 482
Material: Fibrous
A laboratory and experimental-based class investigation of anisotropic fibrous materials as a building component viewed through historical timber design precedents. Topics include low and high-rise framed construction, cross-laminated timber, CNC fabrication methods composite construction, tensile systems, and wood and paper-based products. Structural analysis will explore material properties and connections of a directionally grained and fibrous medium.
Prerequisite(s): (ARCH 230 and ARCH 334 and ARCH 335) or (ARCH 485 and ARCH 486)
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 483
Material: Transparent
An exploration of historical and current technology through the work of artists, architects, craftsmen, and engineers in a brittle medium. Topics include wall systems, connections, structural design of all glass structures, and material properties. Sealants, coatings, adhesives, and impact and blast resistant interlayers will also be covered. A lab component will encourage experimentation of columns, beams, and surfaces from glass components.
Prerequisite(s): (ARCH 230 and ARCH 334 and ARCH 335) or (ARCH 485 and ARCH 486)
Lecture: 1 **Lab:** 2 **Credits:** 3

ARCH 485
Structures I: Structural Analysis -- The System
Basic understanding of the system involves forces, vectors, equilibrium, statics, supports with free body diagrams, material properties, stress, strain, and deformation (force or temperature). Simple structural systems will be analyzed using simple statics and free body diagrams. The latter part of the course will concentrate on structural typologies. Load paths will be analyzed for several different types, construction materials, and structural systems. Principles of deflection will be presented along with vertical and lateral displacement issues.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 486
Structures II: Building Design
A comprehensive investigation of building design viewed through the mechanics of elemental forces. The focus of the class will be the understanding and reduction of complex building concepts into understandable components of the detail, the element, and the system. Topics include lateral resisting components, diaphragms, moment frames, shear walls, and braced frames in historical and current precedents.
Prerequisite(s): ARCH 485
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 487
Eco Structures
Research seminar giving focus to new technologies, especially complex structures: biotechnic, pneumatic, ultra-tall, composite structures, etc. Students conduct research using literature, data sources, and ideas to prepare imaginative small project interdisciplinary approach to solving problems in the built environment.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 488
Long-Span and Special Structures
Introduction of structural systems for long spans and special structures. The structural behavior will be discussed and the required strength and stiffness will be evaluated. Individual projects will be assigned to students to be presented at the end of the course.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 489
Structural Systems for Tall Buildings
The course starts by giving an overview of the state of the art of tall buildings and, in particular, super tall buildings. The developments of structural systems to resist lateral and gravity loads through the years will be explained. Many examples of tall buildings will be given showing the application of such systems. The students will be introduced to structural load design criteria, and they will be taught how to schematically design a tall building. Guest lectures from the practice will participate in the teaching. The course will also make the connection between architecture, structure, and construction. The course will draw from the city of Chicago experience. Prerequisite: Basic knowledge of structures.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 491
Special Problems
Independent study of projects and problems. Students must be advised and have consent of the instructor and approval of the dean.
Credit: Variable

ARCH 495
Technology as Design
Since the development of cast iron as a viable construction material in the mid-1800s, one path of architecture has explored the open-ended possibilities of technology. Integrated within the culture, this determination to use the technology of one's time as the creative generator of a new evolving architecture becomes the historical precedent of the thesis of this course.
Lecture: 3 **Lab:** 0 **Credits:** 3

ARCH 497
Special Projects
Independent study of projects and problems. Students must be advised and have consent of the instructor and approval of the dean.
Credit: Variable

ARCH 498
Academic Training and Research Special Project
Architecture related academic training opportunities (research projects or internships) for students.
Lecture: 0 **Lab:** 6 **Credits:** 3

Architecture and Urbanism (AURB)

AURB 201
The Metropolis
The architectural discourse of the city is introduced through close examination of Chicago and other major urban centers present and past. Themes include the city as a political entity, relationships between urban and architectural form, and the technical infrastructure of the metropolis. A parallel film series explores the cultural construction of urban life.
Lecture: 3 **Lab:** 0 **Credits:** 3

AURB 465
Contemporary Urbanism
This class explores urban form and metropolitan systems and introduces a synthetic overview of the interdependent factors that influence the design of 21st century metropolitan cities. The course covers several cities spanning the globe as case studies to expose students to a range of city-making protocols. Both the urban condition as a whole and less formal, incremental (sometimes spontaneous) urbanisms are presented in detail. The course addresses current day urban challenges, projecting back into the (modernist) past to frame our understanding of the present. Vital issues are spotlighted affecting contemporary architecture and urban design: globalization, technology, social engineering, the environment, and cultural politics. The course enables students to establish a broader definition of "urban" by investigating both common and distinct design strategies of divergent cities.
Prerequisite(s): AURB 201
Lecture: 3 **Lab:** 0 **Credits:** 3

Art and Architectural History (AAH)

AAH 119
History of World Architecture I
Comprehensive background as well as concentration on individual cultures and their architects from ancient to medieval times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Credit: Variable
Satisfies: Communications (C), Humanities (H)

AAH 120
History of World Architecture II
Comprehensive background as well as concentration on individual cultures and their architects from the Renaissance to modern times. Discussion of architectures from around the world. Specific details and expressions of more generalized theories and strategies will be explored.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Credit: Variable
Satisfies: Communications (C), Humanities (H)

AAH 301
Thinking About Art
A course designed for those who find art pleasing, meaningful, or significant and who want to extend the range of their sensibilities. Theories of art will be studied for insight, as well as for historical interest and continuity. Works of art will be studied for their intrinsic value, for their relation to ideas and events, and as cultural artifacts. Regular visits to area museums and galleries will be required.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

AAH 322
19th Century American Art and Culture
This course explores the artistic history of the United States, from an agrarian society that developed into an industrialized nation with a distinguished national art. This broad chronological survey begins with the colonial art of Copley, Peale, West and Stuart, followed by the nation building iconography of the Hudson River School. The art of Mount and Bingham reflect antebellum culture, followed by Johnson in post-Civil War America on the eve of the Gilded Age. Finally, the course examines the realism of Homer and Eakins, defining a truly American iconography.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

AAH 323
20th Century American Art and Culture
This broadly chronological survey begins with Sargent and Cassett in the context of European traditions. Impressionism comes to America through the art of Chase and Hassam, and other members of "The Ten". Early Modernism follows with Henri, Glackens and Sloan, leading artists of "The Eight" and the Ashcan painters, including Bellows. The major regionalists include Benton, Wood, and O'Keefe with Hopper emerging as the most significant artist of the century. With New York as the new center of Western art in post-war America, Pollock defines abstract Expressionism, followed by Warhol and Pop-Art.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

AAH 380
Topics in Art and Architecture History
An investigation into a topic of current or enduring interest in Art and/or Architectural History which will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

AAH 468
Five Centuries of Contemporary French Architecture
By studying theoretical texts written by five very influential architects over five centuries, the course will provide insight into the qualities of national exceptionalism marked by an innovative and transformative tradition. This tradition has been a central source of the modernist agenda as much as of French culture. This course prepares students for ARCH 469, a course that is part of the Semester Abroad Program. This course may be used for an architectural history elective or a humanities elective; however, it may not be used for both. Students who are not committed to, or do not plan to enroll in, the Semester Abroad Program may also take this course if space is available.
Prerequisite(s): (AAH 119 and AAH 120 and HUM 102) or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

AAH 491
Independent Reading and Research
For advanced students. Instructor permission required.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Credit: Variable
Satisfies: Humanities (H)

AAH 494
Senior Seminar: Theories of Architecture in Historical Perspective
An investigation of the development of formal architectural theory. Writings by architects from antiquity to the present will be studied, analyzed, and criticized. The relation between theory and practice will be emphasized. The implications of particular theories for such other questions as environment, tradition, change, innovation, revolution, and meaning will be considered.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

Biology (BIOL)

BIOL 100
Introduction to the Profession
Introduction to the biological sciences, scientific method, computing tools, and critical thinking.
Lecture: 2 **Lab:** 0 **Credits:** 2
Satisfies: Communications (C)

BIOL 104
Linux and Perl Programming
Introductory class on Linux and Perl programming. Topics include Linux/UNIX operating systems, Bash and other command line shells, remote terminals, the basics of Perl programming, and examples of Perl programming for biological data.
Lecture: 1 **Lab:** 2 **Credits:** 3

BIOL 105
Introduction to Biology
This course, designed for non-majors, considers basic concepts and selected topics in biology beginning at the molecular level and ending with the biosphere. Topics include the following: the chemistry and structure of cells in plants and animals; how cells obtain and use energy; basic genetics and the role of biotechnology in agriculture and medicine; evolution, natural selection, and species formation; the origin and diversity of microbial, plant, and animal life; ecology, organisms, and their environments; and the impact of human population growth and human activity on the systems and resources of our planet. This course is not available to those students for whom BIOL 107 is a required course, including students majoring in Biology, Biochemistry, Chemical and Biological Engineering, Molecular Biochemistry and Biophysics, or any pre-health professional major or minor. BIOL 105 and BIOL 114 constitute a one-year sequence in biology. Acceptable as part of the science component of the General Education Program. Course does not satisfy graduation requirements for Biology, Biochemistry, Chemical and Biological Engineering, Molecular Biochemistry and Biophysics majors.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

BIOL 107
General Biology Lectures
This course emphasizes biology at the organismal level. It provides an introduction to the study of the structure and function of plants and animals, their origin and evolution, their reproduction and genetics, and their diversity and ecological relations. BIOL 107 plus BIOL 115 constitutes a one-year sequence in biology. Acceptable as part of the science component of the General Education Program.
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 109
General Biology Laboratory
A laboratory course to accompany BIOL 107. An introduction to laboratory techniques and their application to the understanding of general biological concepts.
Prerequisite(s): BIOL 105* or BIOL 107*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 3 **Credits:** 1
Satisfies: Communications (C)

BIOL 114
Introduction to Human Biology
This course, designed for non-majors in biology, covers selected topics in biology of particular relevance to humans and to human health and disease. Topics include: Introductory biochemistry and cell structure, organization, and regulation of body systems; human genetics; human development; biotechnology; introduction to human pathogens and infectious diseases including sexually-transmitted diseases and immunologic diseases such as AIDS; human ecology; and human evolution. This course is not available to those students for whom BIOL 115 is a required course, including students majoring in Biology, Biochemistry, Molecular Biochemistry and Biophysics, Chemical Engineering, or Biomedical Engineering, and students in any pre-health profession major or minor. BIOL 107 and BIOL 114 constitutes a one-year sequence in biology. Acceptable as part of science component of the General Education Program.
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 115
Human Biology
This course covers selected topics in biology of particular relevance to humans and to human health and disease. Topics include biology of human cells and selected organ systems; neurobiology including psychoactive drugs and drug addiction; development and birth defects; genetics and genetic diseases; toxicology; the immune system and immunologic diseases such as AIDS; human nutrition and nutritional effects; microbial human diseases. BIOL 107 plus BIOL 115 constitutes a one-year sequence in biology. Acceptable as part of science component of the General Education Program.
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 117
Human Biology Laboratory
A biology laboratory course to accompany BIOL 114 or BIOL 115. A cellular approach to the functional organization of organs and organ systems. Laboratories will include the application of experimental methods and techniques for understanding the relationship between cell structure and function.
Prerequisite(s): BIOL 114* or BIOL 115*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 3 **Credits:** 1
Satisfies: Communications (C)

BIOL 210
Microbiology
This course covers basics of microbiology including structure, genetics, growth, and metabolic diversity of microorganisms. Topics relating to the importance of microorganisms in health, ecosystems, industry, and water and food safety are also covered.
Prerequisite(s): BIOL 107 or BIOL 114 or BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 214
Genetics
An introduction to transmission and molecular genetics designed for both biology and other science and engineering majors. Applications of genetics to solution of various practical problems will also be discussed.
Prerequisite(s): BIOL 107 or BIOL 114 or BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 225
Microbiology Laboratory
Exercises focus on sterile technique, growth requirements of microorganisms, identification of microorganisms using biochemical activities, food, and water microbiology.
Prerequisite(s): BIOL 210*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 6 **Credits:** 2
Satisfies: Communications (C)

BIOL 305
Human Anatomy
This course will provide a comprehensive overview of the structural, functional, and developmental anatomy of the human body. Particular consideration will be given to the bony structures, vasculature, innervation, musculature, and relationships of the various structures to one another.
Prerequisite(s): BIOL 107 or BIOL 114 or BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 327
Introduction to Immunology
Covers general principles of innate and adaptive immunity including structure and function of immune system components, T and B cell development, responses of the immune system to infection, and consequences of immune system failure.
Prerequisite(s): BIOL 107 or BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 401
Introductory Biochemistry
The first part of a one-year Biochemistry series. This semester covers the basic principles of biological chemistry with particular focus on: proteins, nucleic acids, carbohydrates, and lipids; their molecular structure, chemical reactions, and practical methods in characterization; and enzymes and enzyme-catalyzed reactions.
Prerequisite(s): (BIOL 107 or BIOL 115) and CHEM 237
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 402
Metabolic Biochemistry
The second part of a one-year Biochemistry series. This semester deals with biochemistry of metabolism, focusing on: glycolysis, the citric acid cycle, gluconeogenesis, electron transport, and the synthesis and breakdown of biomolecules (amino acids, nucleic acids, lipids, and carbohydrates), blood chemistry, lipid transportation, and metabolic control.
Prerequisite(s): BIOL 401 and CHEM 239
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 403
Biochemistry
Molecular organization of cell structures and cell membranes. Proteins, nucleic acids, carbohydrates and lipids, their molecular structure, characterization and chemical reactions. Enzymes and enzyme-catalyzed reactions and metabolism. Does not satisfy biochemistry requirement for Biology, Biochemistry, or Molecular Biochemistry and Biophysics majors.
Prerequisite(s): (BIOL 107 or BIOL 115 or CHE 311) and CHEM 237
Lecture: 4 **Lab:** 0 **Credits:** 4

BIOL 404
Biochemistry Laboratory
Analytical methods in the chemistry and metabolism of proteins, amino acids, and nucleic acids, including chromatography, spectrophotometry, and electrophoresis. Enzyme reactions.
Prerequisite(s): BIOL 401* or BIOL 402* or BIOL 403*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 6 **Credits:** 3
Satisfies: Communications (C)

BIOL 410
Medical Microbiology
Properties of pathogenic bacteria, fungi, viruses, and parasites and their mechanisms of pathogenesis with a focus on organisms that cause human disease.
Prerequisite(s): BIOL 210
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 413
Genomics and Transcriptomics
Modern nucleic acid sequencing technology has revolutionized the analysis of genes and genomes. In this course, students will learn to use sequence data to analyze the structure and function of genomes. Topics will include sequencing technologies and data, genome assembly, genome annotation and gene expression analysis. Classes will consist of a mixture of lecture and hands-on exercises. A laptop is required.
Prerequisite(s): BIOL 104 and BIOL 214
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 414
Genetics for Engineering Scientists
A course in genetics designed for advanced students in engineering and related disciplines. The course will cover transmission and molecular genetics and their application to the solution of various practical problems. A term paper will be required in addition to in-class examinations. **Instructor permission required.**
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

BIOL 415
Advanced Human Genetics
Emphasis on formal genetics and molecular approaches to human genetics. Topics include analysis of Mendelian inheritance, chromosome mapping of disease genes, mutational analysis, and epigenetic s. Coverage of genomics, methods of gene manipulation, genetic databases, and regulation of gene expression. The origin and consequences of genetic variation in populations and the role of natural selection in evolution will also be discussed.
Prerequisite(s): BIOL 214
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 420
Population Genetics
The study of genetic variation in natural populations is the foundation for modern evolutionary biology. Population genetics covers both the theoretical study of the effects of various forces on genetic diversity and the empirical analysis of genetic variation observed in real populations. Throughout the course, students' understanding of population genetics theory will be reinforced with examples of applications. Topics will include genetic drift, genealogical approaches and coalescence, structured populations and migration mutation and natural selection.
Prerequisite(s): (BIOL 214 and MATH 148) or (BIOL 214 and MATH 151)
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 426
Concepts of Cancer Biology
The course is designed to provide a complete overview of cancer as a disease. It will cover normal and abnormal cell signaling pathways, cancer genes and their regulation, experimental chemical carcinogenesis, metastasis, cancer prevention and therapy, drug development for cancer treatment, cancers of individual organ sites and application of biotechnology for cancer detection and treatment.
Prerequisite(s): BIOL 107 and BIOL 115 and CHEM 237 and BIOL 445* and BIOL 401*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 430
Human Physiology
This course is designed to provide the students with comprehensive knowledge about how the human body functions. It will cover cell physiology, autonomic nervous system, neurophysiology, acid base physiology, cardiovascular physiology, respiratory physiology, renal physiology, gastrointestinal physiology, endocrine physiology, and reproductive physiology. Credits cannot be earned to both BIOL 430 and BIOL 530.
Prerequisite(s): BIOL 114 or BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 431
Animal Physiology Laboratory
This course provides an introduction to some of the basic concepts of physiology through experimental procedures involving laboratory animals and humans. Experiments include EKG, producing and measuring nerve action potential, muscle contraction generation and its mechanism, human blood pressure measurement, human lung capacity measurement, and some other human noninvasive experiments.
Prerequisite(s): BIOL 430*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 6 **Credits:** 3
Satisfies: Communications (C)

BIOL 440
Neurobiology
This course will focus on identification of the anatomical and functional organization of the nervous system and the understanding of the principles of inter-neuronal communication and the integrative functions of the nervous system. Failures in brain functions that can lead to a disease will also be discussed.
Prerequisite(s): BIOL 445
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 445
Cell Biology
Modern studies of cell structure and function at the cellular, subcellular, and molecular levels. Topics include molecular components of cells, membranes, membrane-bound organelles, microtubular and cytoskeletal components and principles of bioenergetics.
Prerequisite(s): (BIOL 107 and CHEM 237) or (BIOL 115 and CHEM 237)
Lecture: 3 **Lab:** 0 **Credits:** 3

BIOL 446
Cell Biology Laboratory
A laboratory course in cell biology to accompany BIOL 445.
Prerequisite(s): BIOL 445*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 6 **Credits:** 3
Satisfies: Communications (C)

BIOL 451
Biological Literature
Library research on advanced topics in biology followed by oral presentations of this research.
Prerequisite(s): BIOL 400-499
Lecture: 2 **Lab:** 0 **Credits:** 2
Satisfies: Communications (C)

BIOL 455
Macromolecular Techniques
Advanced laboratory course in physical biochemistry and biophysical techniques, providing a broad, hands-on, experimental background reinforcing key biophysical concepts; many experiments use expertise and equipment available in our departments or otherwise available to Molecular Biochemistry and Biophysics faculty members through affiliations with the Advanced Photon Source at Argonne National Laboratory.
Prerequisite(s): BIOL 401* or BIOL 403* or CHEM 321* or CHEM 343* or CHEM 348* or PHYS 304* or PHYS 410*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 6 **Credits:** 3

BIOL 475
Health and Disease in Modern Society
The course will discuss biological and medical aspects related to the diseases commonly seeing in the modern society such as diabetes, depression, cancer, Alzheimer's, and autism. The goal of the course is to provoke students' interest in health-related issues and link the life-style to health problems in the modern society. Course will cover basic clinical and molecular aspects of the diseases, and raise awareness of latest discoveries and challenge in the treatment and prevention of the diseases.
Prerequisite(s): BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

BIOL 490
Individual Study
Individual study. Consent of instructor required.
Credit: Variable

BIOL 491
Biology Research Project
An opportunity for advanced undergraduates to participate in research. A written report covering the procedures, data, and conclusion of the problem is required. **Instructor permission required.**
Credit: Variable

BIOL 495
Biology Colloquium
Lectures by prominent scientists. This course exposes students to current and active research in biology both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to our academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.
Lecture: 1 **Lab:** 0 **Credits:** 1
Satisfies: Communications (C)

Biomedical Engineering (BME)

BME 100
Introduction to the Profession
Introduces the student to the scope of the biomedical engineering profession and its role in society, and develops a sense of professionalism in the student. Provides an overview of biomedical engineering through lectures, presentations by outside speakers, hands-on exercises, and scientific literature analyses. Develops professional communication and teamwork skills.
Lecture: 1 **Lab:** 2 **Credits:** 2
Satisfies: Communications (C)

BME 200
Biomedical Engineering Application of MATLAB
In this course, students will apply MATLAB programming to solve quantitative biomedical engineering problems across cell/tissue engineering, neural engineering, and medical imaging. Students will also be exposed to additional engineering and product development programming tools and environments.
Prerequisite(s): MATH 252* and CS 104, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 1 **Lab:** 2 **Credits:** 2

BME 301
Bio-Fluid Mechanics
Basic properties of fluids in motion. Lagrangian and Eulerian viewpoints, material derivative, streamlines. Continuity, energy, angular and linear momentum equations in integral and differential forms. Applications in biofluids and biomedical devices; rheology of biological fluids.
Corequisite(s): BME 320
Prerequisite(s): MATH 251 and MMAE 200 and BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 309
Biomedical Imaging
An introduction to biomedical imaging concepts and modalities. Topics covered include general principles of image science (image quality, sampling, etc.), X-ray-based imaging [conventional x-ray imaging, mammography, computed tomography (CT), and digital subtraction angiography (DSA)], and nuclear medicine [gamma camera, single photon emission computed tomography (SPECT), and positron emission tomography (PET)].
Prerequisite(s): (BME 330* or ECE 308*) and PHYS 221, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 310
Biomaterials
Applications of biomaterials in different tissue and organ systems. Relationship between physical and chemical structure of materials and biological system response. Choosing, fabricating, and modifying materials for specific biomedical applications.
Prerequisite(s): CHEM 125 and PHYS 123
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

BME 315
Instrumentation and Measurement Laboratory
Laboratory exercises stress instrumentation usage and data analysis used to determine physiological functions and variables and the relations to the physiological variability.
Prerequisite(s): ECE 211* and BME 200, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 0 **Lab:** 3 **Credits:** 1

BME 320
Fluids Laboratory
Laboratory experiments in thermodynamics, biological fluid flow, and heat transfer. Emphasis is placed on current methods, instrumentation, and equipment used in biomedical engineering; oral presentation of results; and on the writing of comprehensive reports. Open only to Biomedical Engineering majors.
Corequisite(s): BME 301
Prerequisite(s): BIOL 117 and BME 315
Lecture: 0 **Lab:** 3 **Credits:** 1
Satisfies: Communications (C)

BME 325
Bioelectronics Laboratory
Practical hands on design, construction and testing of electric and electronic circuitry for biomedical applications. Basic concepts will be presented with emphasis on their relevance to the design of systems that can be used for clinical and basic scientific research.
Prerequisite(s): ECE 213 and BME 315
Lecture: 0 **Lab:** 3 **Credits:** 1

BME 330
Analysis of Biosignals and Systems
This course is a junior level introduction to the theoretical and practical aspects of signal processing and dynamic systems behavior as they relate to physiological, biological, and biomedical systems. The topics covered will include sampling theory, continuous and discrete Fourier transforms and series, Laplace transforms, Linear systems theory, signal filtering, models of biological and physiological systems, and analysis of dynamic and feedback systems.
Prerequisite(s): ECE 211 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 331
Modeling and Control of Biological Systems
The course expands upon the systems and signal processing concepts introduced in BME 330 to develop the tools to model physiological processes and the feedback control of these processes.
Prerequisite(s): (BME 330 or ECE 308) and BME 422
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 335
Thermodynamics of Living Systems
Principles of thermodynamics and conservation of mass applied to living systems and biomedical devices. The first and second laws of thermodynamics, pHs and chemical equilibrium, metabolic stoichiometry and energetics.
Prerequisite(s): CHE 202 and BME 301* and MATH 251, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 402
Introduction to Regulatory Science for Engineers
Engineers must be equipped to answer the growing demands for new medical technologies. Introduction to Regulatory Science teaches engineers how the regulated environment impacts the design, testing. and delivery of medical devices. It will equip students with the essential skills and tools critical to the practice of engineering in the medical device industry. In this course, students will be exposed to the core concepts, processes, and tools surrounding the global medical device regulatory framework, and will gain foundational knowledge for the practical application of regulations throughout the product development lifecycle. From knowledge gained in the class, students will be expected to work in teams and use critical thinking, data analysis and interpretation skills to research, evaluate, and present a scientific, technical, and legally justifiable approach for the global introduction of a new medical device.
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 405
Physiology Laboratory
A laboratory course which demonstrates basic concepts of bioengineering design through experimental procedures involving humans and experimental animals. Statistical principles of experimental design. Study of possible errors. Experiments include nerve action, electrocardiography, mechanics of muscle, membranes, and noninvasive diagnostics in humans. Open only to Biomedical Engineering majors.
Corequisite(s): BME 453
Prerequisite(s): BME 315
Lecture: 0 **Lab:** 3 **Credits:** 1

BME 417
Technologies for Treatment of Diabetes
Study of physiological control systems and engineering of external control of biological systems by focusing on an endocrine system disorder -- diabetes. The effects of type 1 diabetes on glucose homeostasis and various treatment technologies for regulation of glucose concentration. Development of mathematical models describing the dynamics of glucose and insulin concentration variations, blood glucose concentration measurement and inference techniques, insulin pumps, and artificial pancreas systems.
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 418
Reaction Kinetics for BME
This course focuses on analysis of rate data and single and multiple reaction schemes. Biomedical topics include biological systems, enzymatic pathways, enzyme and receptor-ligand kinetics, pharmacokinetics, heterogeneous reactions, microbial cell growth and product formation, and the design and analysis of biological reactors.
Corequisite(s): BME 482
Prerequisite(s): BIOL 403 and MATH 252 and BME 335
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 419
Introduction to Design Concepts in Biomedical Engineering
Introduction to Design Concepts in Biomedical Engineering. This course aims to educate students on project definition, and on the design, development and technology transfer of potential biomedical products in the context of the student's major capstone project. Students will learn best practices for designing a marketable medical device, including the design process from the clinical problem definition through prototype and clinical testing to market readiness.
Prerequisite(s): BME 315 and (BME 320 or BME 325) and BME 422
Lecture: 2 **Lab:** 0 **Credits:** 2
Satisfies: Communications (C)

BME 420
Design Concepts in Biomedical Engineering
An introduction to the strategies and fundamental bioengineering design criteria behind the development of biomedical engineering systems and implantable devices that use either synthetic materials or hybrid (biological-synthetic)systems. Analysis and design of replacements for the heart, kidneys, and lungs. Specification and realization of structures for artificial organ systems. Students will be required to complete a team-oriented design project in their chosen track.
Prerequisite(s): BME 419
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

BME 422
Mathematical Methods for Biomedical Engineers
This course integrates mathematical and computational tools that address directly the needs of biomedical engineers. The topics covered include the mathematics of diffusion, pharmacokinetic models, biological fluid mechanics, and biosignal representations and analysis. The use of MATLAB will be emphasized for numerically solving problems of practical relevance.
Prerequisite(s): (MATH 252 and CS 104) and (BME 330* or ECE 308*), An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 423
Cell Biomechanics: Principles and Biological Processes
This course will provide students an opportunity to learn about mechanical forces that develop in the human body and how they can influence cell functions in a range of biological processes from embryogenesis, wound healing, and regenerative medicine to pathological conditions such as cancer invasion. Examples of research methods for investigating cell biomechanics in various biological systems will be discussed.
Prerequisite(s): BME 301
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 424
Quantitative Aspects of Cell and Tissue Engineering
This course is designed to cover fundamentals of cell and tissue engineering from a quantitative perspective. Topics addressed include elements of tissue development, cell growth and differentiation, cell adhesion, migration, molecular and cellular transport in tissues and polymeric hydrogels for tissue engineering and drug delivery applications.
Prerequisite(s): BME 418 and BME 482 and BME 422
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 425
Introduction to Medical Devices, BioMEMS and Microfluidics
This course will present fundamentals and applications of medical devices, BioMEMS, and microfluidic technologies for applications in the broad health and biomedical engineering. It will provide a broad view of the general field and a knowledge of relevant fabrication methods and analysis techniques. Fabrication and analytical techniques, interfacing with biological materials, and techniques for analyte detection will be emphasized. The course will include individual projects and critical paper reviews in which each student will be encouraged to master basic concepts in design and fabrication for devices for specific applications.
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 427
Extracellular Matrix Biology
The Extra Cellular Matrix (ECM) is that which connects cells in tissues and provides much of the organization and support in almost every tissue and or organ system of the body. Thus the aim of this course is to give students insights into ECM biology and its relevance to modern medicine and biomedical (tissue) engineering. A significant portion of working population is suffering from ECM-related maladies, and the focus of research has shifted into creating ECM implants. The ECM implant market is growing rapidly. For instance, the collagen meniscus implant market was reported to be at $308.6 million in 20181. Understanding the implications of the molecular biology of ECM to feed into this research is highly relevant for students considering careers (academic and industry) in life sciences in industry, academia and healthcare. Extracellular Matrix (ECM) is a highly complex system in mammalian biology responsible for structural support and functional (biochemical) signals for physiology. Specific amino acid sequences on the various ECM elements are responsible to trigger intra- and extracellular cascades leading to cell division, proliferation, tissue regeneration, wound healing and inflammation. This course will focus on the following key concepts: a) Gene expression, structure and function of various ECM proteins and complexes and the physiological processes. b) Etiology and the molecular progression of diseases caused by abnormalities to ECM proteins. c) Mechanobiology of various ECM proteins. d) Structure function and mechanical function of ECM interfaces with other tissues (muscle, bone, skin etc.) e) Implications for tissue engineering and development of novel biomimetic and biological ECM implants.
Lecture: 750 **Lab:** 0 **Credits:** 3

BME 431
Modern Optics and Lasers
This is an undergraduate course covering the basics of optics and modern aspects of the field such as lasers and nonlinear optics. Connections to other fields such as acoustics, microwaves, electron-beam optics, quantum mechanics will be pointed out. The theory will be supplemented with demonstration experiments of optical phenomena. Practical problems will be discussed such as the design of an optical imaging system or precision interferometry.
Prerequisite(s): PHYS 221
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 433
Biomedical Engineering Applications of Statistics
Application of modern computing methods to the statistical analysis of biomedical data. Sampling, estimation, analysis of variance, and the principles of experimental design and clinical trials are emphasized.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 437
Introduction to Molecular Imaging
This course provides an overview of molecular imaging, a subcategory of medical imaging that focuses on noninvasively imaging molecular pathways in living organisms. Topics include imaging systems, contrast agents, reporter genes and proteins, tracer kinetic modeling. Preclinical and clinical applications will also be discussed with an emphasis on cancer and the central nervous system.
Prerequisite(s): BME 422
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 438
Neuroimaging
This course describes the use of different imaging modalities to study brain function and connectivity. The first part of the course deals with brain function. It includes an introduction to energy metabolism in the brain, cerebral blood flow, and brain activation. It continues with an introduction to magnetic resonance imaging (MRI), perfusion-based fMRI, BOLD fMRI, fMRI paradigm design and statistical analysis, introduction to positron emission tomography (PET) and studying brain function with PET, introduction to magneto encephalography and studying brain function with (MEG). The second part of the course deals with brain connectivity. It includes an introduction to diffusion tensor MRI, explanation to the relationship between the diffusion properties of tissue and its structural characteristics, white matter fiber tractography.
Prerequisite(s): PHYS 221
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 439
Advanced Medical Imaging
This course introduces advanced clinical imaging modalities, research imaging techniques, and concepts from image science and image perception. The first part of the course introduces the perception of image data by human observers and the visualization of brain structure and function. It includes an introduction to magnetic resonance imaging (MRI) and a survey of neurological imaging via functional MRI (fMRI). The second part of the course covers image science, clinical imaging applications, and novel research imaging techniques. It includes an introduction to radiation detection and image quality evaluation, a survey of clinical cases, and an overview of new imaging methods.
Prerequisite(s): BME 309
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 443
Biomedical Instrumentation and Electronics
Principles of circuit analysis are applied to typical transducer and signal recording situations found in biomedical engineering.
Prerequisite(s): BME 315 and ECE 211
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 445
Quantitative Neural Function
Computational approach to basic neural modeling and function, including cable theory, ion channels, presynaptic potentials, stimulation thresholds, and nerve blocking techniques. Synaptic function is examined at the fundamental level.
Prerequisite(s): BME 453
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 450
Animal Physiology
Respiration; circulation; energy metabolism; temperature regulation; water and osmotic regulation; digestion and excretion; muscle and movement; nerve excitation; information control and integration; chemical messengers. Emphasis on general principles with examples drawn from various animal phyla. Same as BIOL 430.
Prerequisite(s): BIOL 107 or BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 452
Control Systems for Biomedical Engineers
Control systems design and analysis in biomedical engineering. Time and frequency domain analysis, impulse vs. step response, open vs. closed loop response, stability, adaptive control, system modeling. Emphasis is on understanding physiological control systems and the engineering of external control of biological systems.
Prerequisite(s): BME 330
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 453
Quantitative Physiology
This course provides a quantitative approach to fundamental physiological principles and systems. The course covers basic cell physiology, membrane transport, action potentials and excitable tissue, and skeletomuscular, nervous, cardiovascular, respiratory, renal, and endocrine systems.
Corequisite(s): BME 405
Prerequisite(s): BIOL 115
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 455
Cardiovascular Fluid Mechanics
Anatomy of the cardiovascular system. Scaling principles. Lumped parameter, one-dimensional linear and nonlinear wave propagation, and three-dimensional modeling techniques applied to simulate blood flow in the cardiovascular system. Steady and pulsatile flow in rigid and elastic tubes. Form and function of blood, blood vessels, and the heart from an engineering perspective. Sensing, feedback, and control of the circulation. Possible project using custom software to run blood flow simulations. Same as MMAE 455.
Prerequisite(s): BME 301 or MMAE 310 or MMAE 313
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 475
Neuromechanics of Human Movement
Concepts from mechanics and neurophysiology will be introduced and employed to analyze and model human movement, especially of the extremities. Topics will include forward and inverse kinematics and dynamics, muscle modeling, and feedback control.
Prerequisite(s): BME 330 or ECE 308 or MMAE 305
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 482
Mass Transport for Biomedical Engineers
This course seeks to provide students with an introduction to advanced concepts of mass transport with an emphasis on biological systems. Students will be exposed to derivation of the conservation equations for heat, mass, and momentum. Following derivation of these laws, focus will be placed on mass transport applications, including diffusion, convection-diffusion, diffusion with reactions, and facilitated diffusion. Students will be able to apply mass transport equations to solve problems in biological systems.
Corequisite(s): BME 418
Prerequisite(s): BME 301 and CHE 202
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 490
Senior Seminar
Professional issues in bioengineering. Role of bioengineers in industry. Professional identity. Structure of bioengineering industries and product development process. Job market analysis. Current employment opportunities. Recruiting process and interview. Analysis of employer. Marketing versus engineering. Management by objective. Role of higher degrees.
Lecture: 0 **Lab:** 0 **Credits:** 0
Satisfies: Communications (C)

BME 491
Independent Study
Focused reading and study under the supervision of a BME faculty member. A final written report is required to receive credit. **Instructor permission required.**
Credit: Variable
Satisfies: Communications (C)

BME 492
Undergraduate Research
Independent research (experimental or theoretical/computational) under the supervision of a BME faculty member. A final written report is required to receive credit. **Instructor permission required.**
Credit: Variable
Satisfies: Communications (C)

BME 493
BME Undergraduate Project
Research or design projecting involving 2 or more students under supervision of a BME faculty member. A final written report from each student is required to receive credit. **Instructor permission required.**
Lecture: 3 **Lab:** 0 **Credits:** 3

BME 497
Special Problems
Design, development, analysis or research on special topics defined by a faculty member or the department. **Instructor permission required.**
Lecture: 0 **Lab:** 3 **Credits:** 3

Business (BUS)

BUS 100
Introduction to Business
This course introduces students not only to the business environment but also to the different purposes and functions of businesses. Students will obtain a broad understanding of the fundamentals of business organizations and their operations and, in the process, learn the basic terminology and concepts employed in the business world. Students will also gain experience using computer applications popular in the business community such as Excel, Word, and Access Database.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Ethics (E)

BUS 102
Computing Tools for Business Analysis
This course builds competency with the most commonly used software tools used in business (Microsoft Excel, Access, Word, and Power Point) while also reinforcing business concepts, modes of thinking, and communication skills. Course sessions, held in a PC lab, will cover basic-through-intermediate skills for each application using exercises and mini-cases that require students to analyze business problems and consider how best to communicate information, results, and findings. Course work will be integrated across the various tools in the Office suite and also across various business disciplines. Students will learn not just the computing tools themselves but also how such tools are used in today's business environment to manage information, analyze data, and communicate more effectively.
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 103
Ideation: What Are My Interests?
This course introduces students to methods of exploration and analysis of ideas. Students will participate in creativity exercises, practice brainstorming, and use tools (such as SWOT) that will provide a framework for analyzing interests and understanding comparative values. Students will practice storyboarding techniques and learn to present their ideas in a clear and concise manner.
Lecture: 0 **Lab:** 1 **Credits:** 1

BUS 104
Needs Analysis and Opportunity Analysis Aligned with My Interests
This course introduces students to user observation and research tools. Students will apply these tools to their project idea. Students will learn research planning and employ several methods, such as ethnographic interviewing techniques or journals/diaries, and translate their findings into a report.
Lecture: 1 **Lab:** 0 **Credits:** 1

BUS 203
Identification and Evaluation of Prospective Consumers
This course introduces students to primary and secondary market research tools and analysis. Students will be expected to go into the field to research prospective consumers relevant to their project. Students will learn of research sources beyond Google. Students will also learn and apply analytical techniques to understand the data.
Prerequisite(s): BUS 104
Lecture: 1 **Lab:** 0 **Credits:** 1

BUS 204
Identification and Evaluation of Competitive Advantage
Students will be expected to determine the strengths and weaknesses of the competitors within the target market, strategies that will provide the startup with a distinct advantage, the barriers that can be developed to make the competitive advantage sustainable, and any weaknesses that can be exploited within the product development cycle.
Prerequisite(s): BUS 203
Lecture: 1 **Lab:** 0 **Credits:** 1

BUS 210
Accounting for Non-Business Majors
This course introduces the student to basic financial and managerial accounting topics: GAAP, the major financial statements, accrual accounting, financial reporting alternatives, financial statement analysis, cost behavior, cost systems, short-term and long-term decision-making, and product costing. BUS 210 should not be taken by business majors.
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 211
Financial Accounting
This course introduces students to the financial reporting practices of firms ranging in size from sole proprietorships to Fortune 500 companies. Although the predominant focus will be on reporting principles used in the United States, the course will consider international reporting standards as well. Students will learn some of the metrics (ratios) by which one measures the financial health of a firm, whether small or large, domestic or international. Finally, using a popular financial management software package, students not only will learn how businesses track their day-to-day transactions and report on operations but also will be able to apply this knowledge to their personal and/or business finances.
Prerequisite(s): BUS 100
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Ethics (E)

BUS 212
Managerial Accounting
This course introduces students to how managers use accounting information to make decisions and to monitor and control the operations of their businesses. Students will learn how an entity's profits respond to changes in sales volume, selling prices, and costs. They will also learn how to distinguish between relevant and irrelevant information and use the former to make sound business decisions. The principles introduced in this course are applicable to domestic and international businesses of all sizes.
Prerequisite(s): BUS 211
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 221
Business Statistics
Business decisions are often difficult and risky because decisions have to be made with incomplete and imperfect information. The primary purpose of this course is to introduce the basics of modeling and analyzing complex problems that involve business decision-making under uncertainty. Students will learn probability theory and some basic statistical concepts and procedures. The course emphasizes techniques for formulating decision problems and analyzing data. Students will also learn how to use computer software in decision and statistical analyses.
Prerequisite(s): MATH 151 and BUS 100
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 301
Organizational Behavior
Successful managers are able to align business strategies with the organization's culture and core competencies. In this course, students will develop the managerial skills needed to succeed in today's increasingly competitive global economy. The course explores how individuals are motivated to learn, decide, and coordinate in individual versus group settings. Students will apply these concepts to resolve a wide array of problems in real world organizational settings, such as creating an innovative culture, developing an effective performance management system, and managing a diverse workforce. Particular emphasis will be given to development of leadership skills and entrepreneurism.
Prerequisite(s): (BUS 100 and ECON 151) or ECON 211
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Ethics (E)

BUS 303
Financial Analysis: Pro-Forma Financial Statements
Financial Analysis: Pro-Forma Financial Statements requires students to develop pro-forma financial statements for a business of their own choosing. They will begin by subjecting at least two similar firms (the "comparable" firms) to a rigorous financial analysis with the objective of identifying their strengths and weaknesses. In the process, students will investigate measures of liquidity (short-term and long-term), efficiency, and profitability. Utilizing the strengths and weaknesses of the comparable firms, students will develop pro-forma financial statements for their own business.
Prerequisite(s): BUS 351 and BUS 204
Lecture: 1 **Lab:** 0 **Credits:** 1

BUS 305
Operation and Supply Chain Design
This course introduces students to concepts and techniques related to the design, planning, control, and improvement of both service and manufacturing operations. The course helps students become conversant in the language of operations management and provides them with the quantitative and qualitative tools needed to analyze basic operations issues. It also describes the role of operations management in the overall strategy of a firm. The topics covered include process analysis, waiting line management, project management, inventory and supply chain management.
Prerequisite(s): MATH 151 and BUS 100
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 311
Strategic Cost Management
This course explores the uses and limitations of accounting information as an integral part of a manager's decision process. BUS 311 goes beyond BUS 211 and 212 by integrating economics, finance, and statistics among other disciplines in the consideration of actual business cases. Some of the topics included will be cost estimation, activity-based costing, quality control, transfer pricing, and divisional performance evaluation.
Prerequisite(s): BUS 351 and BUS 212
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 321
Optimization and Decision-Making
The role of business decision-making is often how to best design and operate a system. Many managerial decisions, regardless of their functional orientation, are, therefore, increasingly based on analysis using quantitative models from the discipline of management science. Management science tools, techniques and concepts have dramatically changed the way business operates in manufacturing, service operations, marketing, and finance. BUS 321 introduces students to various ways of modeling, or thinking structurally about, decision problems in order to enhance decision-making skills. Students will gain experience using spreadsheets to deal with complex managerial decision problems.
Prerequisite(s): BUS 221
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 341
Business Law
BUS 341 surveys the many challenges and opportunities faced by the entrepreneur in the modern global economy. Starting with basic contract law, corporate law, and intellectual property law, the course then explores issues of business organization for entrepreneurs, the legal implications of debt and equity financing, the protection of the expression of ideas that is afforded by copyrights, and the protection of corporate goodwill that is afforded by trademark law as well as the statutory restraints imposed by statutes such as the Financial Services Modernization Act, the Health Insurance Portability and Accountability Act ("HIPPA"), and Children's Online Privacy Protection Act ("COPPA"). The course will broaden the student's perspective into the international environment by studying cross-border data privacy as well as statutes such as the Foreign Corrupt Practices Act ("FCPA").
Prerequisite(s): BUS 100
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Ethics (E)

BUS 351
Financial Decision-Making
BUS 351 introduces students to time value of money concepts and how these concepts are used in making long-term financial decisions. In addition, the course will expose students to after-tax cash flow analysis using a variety of decision models that are appropriate for sole proprietorships, partnerships, and corporations, whether they are newly-founded or established firms. Many of the principles introduced here can be applied to personal financial decisions such as retirement planning, car loan analyses and home mortgage analyses, for example.
Corequisite(s): BUS 212
Prerequisite(s): BUS 212* and BUS 221, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 361
Entrepreneurship I
BUS 361 focuses on the role of entrepreneurship within larger, established companies. It provides students wishing to become either corporate managers or entrepreneurs with the information, frameworks and techniques needed to plan, start, evaluate, control, and successfully operate corporate ventures.
Prerequisite(s): BUS 351
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Ethics (E)

BUS 371
Marketing Fundamentals
BUS 371 focuses on the information, frameworks and techniques required to devise a marketing strategy for the organization. The course begins with an understanding of how to design products and services for consumers based on their needs and their budget constraints. It then moves to an evaluation of the capabilities of the firm, its collaborators, and its competitors in service of developing appropriate price and promotion strategies when going to market. This course has no formal pre-requisites, but students will benefit from a basic background in microeconomics and basic statistics.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Ethics (E)

BUS 382
Business Economics
This course focuses on the use of economic principles for business and managerial decision making. The course aims to provide students with frameworks for studying business decisions that managers routinely face and equip students with the tools necessary to better understand the ramifications of their choices. The course builds on concepts of microeconomics and the theories of industrial organization to deliver formal methods for analyzing business decisions. After reviewing consumer and producer theories, the course will delve into game theory, information economics, and the study of imperfectly competitive markets, and proceed to introduce students to business strategies that assist managers in earning and sustaining competitive advantages in the marketplace.
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 403
Developing a Strategically Competitive Business Plan
This course introduces students to the research process for developing business plans. They will evaluate a business concept, collect, analyze and organize market research data into a marketing plan; formulate a business model; and prepare financial projections, among other key components of a formal business plan.
Prerequisite(s): BUS 304
Lecture: 1 **Lab:** 0 **Credits:** 1

BUS 404
Selling Your Business Plan
In BUS 404 students will be expected to explore various options in raising money to fund a business, their advantages and disadvantages, the right ways to negotiate and close the deals.
Prerequisite(s): BUS 403
Lecture: 1 **Lab:** 0 **Credits:** 1

BUS 452
International Finance
International finance is a combination of macroeconomics and finance. The course covers macroeconomic models of exchange rate and interest rate determination and it also covers the participants and instruments that trade in the foreign exchange market. By the end of the course, participants should be able to construct portfolios and analyze the risk of their positions.
Prerequisite(s): BUS 351
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 454
Investments
The course is a survey of asset pricing theory. The fundamentals of bond and option pricing are covered as well as the CAPM, APT and the Fama French models. Excel spreadsheet modeling is used to illustrate and understand the concepts of Markowitz's Mean Variance Optimization, equity valuation, option pricing, and utility theory.
Prerequisite(s): BUS 351
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 455
Corporate Finance
This course is an advanced introduction to modern corporate finance. Topics include cash flow forecasting, optimal dividend policies, mergers and acquisitions, structured finance, capital at risk, and the risk of adjusted return on capital. The philosophical foundation of the course is the concept of shareholder value added. Students will learn how financial decisions can contribute to the value of modern corporation.
Prerequisite(s): BUS 351
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 456
Financial Economics I
This course provides a systematic exposition of the primary mathematical methods used in financial economics. Mathematical concepts and methods include logarithmic and exponential functions, algebra, mean-variance analysis, summations, matrix algebra, differential and integral calculus, and optimization. The course will include a variety of financial applications including compound interest, present and future value, term structure of interest rates, asset pricing, expected return, risk and measures of risk aversion, capital asset pricing model (CAPM), portfolio optimization, expected utility, and consumption capital asset pricing (CCAPM).
Prerequisite(s): BUS 351
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 457
Financial Modeling I
This course is the first of three subjects that form the Financial Modeling Sequence. It is designed to provide students with the necessary programming skills necessary to create realistic financial models. It is an essential core subject and must be completed in order to obtain the MSF degree. Modeling I focuses on the implementation of financial models in MS Excel using Visual Basic for Application (VBA).
Prerequisite(s): BUS 351
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 458
Financial Derivatives
This course provides the foundation for understanding the price and risk management of derivative securities. The course starts with simple derivatives (e.g., forwards and futures) and develops the concept of arbitrage-free pricing and hedging. Based upon the work of Black, Scholes, and Merton, the course extends their pricing model through the use of lattices, Monte Carlo simulation methods, and more advanced strategies. Mathematical tools in stochastic processes are gradually introduced. Particular emphasis is given to the pricing of interest rate derivatives.
Prerequisite(s): BUS 221 and BUS 351 and BUS 321
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 467
Entrepreneurship II
BUS 467 focuses on the behaviors of entrepreneurs (both successful and unsuccessful), entrepreneurial networks, the venture creation process, new venture strategies, identification and evaluation of new venture opportunities, new venture financing, legal and tax considerations, market entry strategies, and the development of a formal business plan in a global context.
Prerequisite(s): BUS 351
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 469
Entrepreneurship Capstone
BUS 469 provides students a hands-on, real world opportunity to: 1) identify, investigate and/or evaluate the suitability of a product or service to the marketplace; 2) work with an existing company to evaluate and/or investigate a product or service opportunity for the company; or 3) investigate and/or evaluate a research-based technology for suitability as a product or service. Students will either build or join a small team to develop a prototype, engage customers/partners, and identify support and/or funding. Business students who have taken the prerequisite (or equivalent) courses may register with instructor approval. Prerequisite: Entrepreneurship Minor Classes (4) and IPRO.
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 471
Marketing Management
The Marketing Management course is designed to provide students with an overview of the decision making process in marketing. Marketing decision-making is a process that is essentially wrapped around the fundamental goal of creating value in the marketplace. This requires a professional knowledge of market drivers, competitors' capabilities, technological trends, and the market dynamics of value. The orientation is toward the kinds of marketing decisions that managers must make within the modern business environment. A primary goal of this course is to provide a thorough understanding of the rapidly changing business environment and the various stakeholders that influence the marketing management function.
Prerequisite(s): BUS 371
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

BUS 472
New Product Development
This course offers students a solid grounding in the theory and practice of new product development. Using a combination of theory-based lecture, hands-on exercises and assignments, and discussion, students will develop skills across the entire product development process--from opportunity identification through product launch.
Prerequisite(s): BUS 371
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

BUS 473
Marketing Research
This course provides students with a detailed exposure to state-of-the-art marketing research techniques and their applications. Topics include: problem definition, research design, exploratory research, the use of secondary and syndicated data sources and questionnaire development and analysis. Course exercises and projects will emphasize the use of research information for effective marketing decision making.
Prerequisite(s): BUS 371
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Ethics (E)

BUS 475
Sales Management
Addressing modern technology and methods of selling and presenting highly technical subjects is the basis of this course. Engineers, Information Technologists, Architects, and those dealing with state of the art products will benefit from this new created course that will address the rapidly changing profession of highly skilled representatives, sales persons, and entrepreneurs. The class content will include guest speakers from technical corporations, leading promotion and e-commerce firms to discuss basic requirements for sustaining current customer base and increase gross sales. Application, simulation and case studies from small and mid-sized firms will be reviewed.
Prerequisite(s): BUS 371
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 476
Consumer Behavior
Good marketing practice requires an understanding of consumers: their needs, why they buy, and how they buy. this course draws on the fields of psychology, sociology, economics, demography, and anthropology to study the various internal and external influences on consumer behavior and decision making. Topics include: perception, memory and learning, motivation, attitudes and attitude change, involvement, cultural and cross-cultural influences, communications and influence tactics, and customer satisfaction.
Prerequisite(s): BUS 371
Lecture: 3 **Lab:** 0 **Credits:** 3

BUS 480
Strategic Management and Design Thinking
BUS 480 presents a conceptual and analytical framework for understanding the operation of the firm within a changing business environment from the perspective of the upper management team. The course develops the student's ability to think constructively about the pursuit of sustainable competitive advantage through the systematic identification, evaluation and creation of attractive business and corporate opportunities.
Prerequisite(s): BUS 467
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Ethics (E)

BUS 497
Independent Study in Business
Independent study in Business as designed to provide the student with an option to study a specific area of Business in more depth than is offered in the curriculum. For example, a student could expand upon subject matter contained in the existing curriculum, or the student could explore an area of business not currently in the curriculum. In either event, the student, the instructor, and the student's advisor must agree upon a plan of study prior to enrolling in the course. **Instructor permission required.**
Credit: Variable

BUS 498
Undergraduate Workplace Immersion
This course provides undergraduate students with a supervised, immersive, hands-on experience in a US workplace where they will gain exposure to an industry and practical experience with projects related to their interests. Students will work for a minimum of eight weeks, 32 hours/week. Students will be matched with an organization according to their area of study, related experience, and/or relevant skillset.
Lecture: 0 **Lab:** 6 **Credits:** 3

Chemical Engineering (CHE)

CHE 100
Introduction to the Profession I
Introduction to chemical engineering and engineering productivity software. Communication skills development, technical reporting and presentation, engineering ethics, and a variety of topics are discussed.
Lecture: 1 **Lab:** 2 **Credits:** 2
Satisfies: Communications (C)

CHE 101
Introduction to the Profession II
A continuation of CHE 100. Advanced engineering applications of productivity software. Engineering graphics and technical flow sheeting. Team project research and project management skills. Internet publishing.
Prerequisite(s): CHE 100 or MMAE 100
Lecture: 1 **Lab:** 2 **Credits:** 2
Satisfies: Communications (C)

CHE 202
Material Energy Balances
Material and energy balances for engineering systems subjected to chemical and physical transformations. Calculations on industrial processes.
Prerequisite(s): (MATH 152 and CHEM 100-499) and (CS 105 or CS 115 or CS 104)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

CHE 239
Mathematical and Computational Methods
Utilization of numeric and analytic methods to find solutions to a variety of chemical engineering problems. Emphasis placed on development of computer code, and interpretation of results. Topics covered include systems of algebraic equations, initial value differential equations, and boundary value differential equations.
Prerequisite(s): CHE 202 and MATH 252* and CHE 301*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 296
Introduction to IPRO
Introduction to process design. Principles and techniques in effective teamwork. Performance of selected design tasks in project groups integrated with CHE/IPRO 496. Practice with process design software. First part of CHE/IPRO 296-CHE/IPRO 496 project package. Only CHE students should register for this course.
Prerequisite(s): CHE 202 and CHE 101
Lecture: 0 **Lab:** 2 **Credits:** 1
Satisfies: Communications (C)

CHE 301
Fluid Mechanics
Flow of fluids. Fundamentals of fluid flow design equations as applied to selected unit operations.
Prerequisite(s): MATH 252 and CHE 202
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 302
Heat and Mass Transfer Operations
Fundamentals of heat and mass transfer. Heat and mass transfer design equations as applied to selected unit operations. Mass transfer in stage-wise and continuous contacting equipment. Unsteady state operations in mass transfer equipment.
Prerequisite(s): CHE 301
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 311
Foundations of Biological Science for Engineering
This introductory course will introduce engineering students to basic principles of Biological Sciences, which will enable them to understand more advanced courses on the topic and provide a solid base for further study in all life sciences-related topics required in their individual programs.
Prerequisite(s): CHEM 125
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 317
Chemical and Biological Engineering Laboratory I
Laboratory work in the unit operations of chemical engineering, fluid flow, heat transfer, and other selected topics.
Prerequisite(s): CHE 301
Lecture: 1 **Lab:** 3 **Credits:** 2
Satisfies: Communications (C)

CHE 351
Thermodynamics I
Laws of thermodynamics and their application to chemical engineering operations.
Prerequisite(s): CHEM 343 and CHE 202
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 406
Transport Phenomena
The equations of change in different coordinate systems (mass, momentum, and energy transport). Velocity distribution in laminar and turbulent flow. Formulation and analytical solutions to the problems of viscous flow, molecular diffusion, heat conduction and convection.
Prerequisite(s): CHE 301 and CHE 302 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 412
Foundations of Biological Science for Engineering
This introductory course will introduce graduate engineering students to basic principles of Biological Sciences, which will enable them to understand more advanced courses on the topic and provide a solid base for further study in all life sciences-related topics required in their individual programs.
Prerequisite(s): CHEM 125
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 416
Technologies for Treatment of Diabetes
Study of physiological control systems and engineering of external control of biological systems by focusing on an endocrine system disorder -- diabetes. The effects of type 1 diabetes on glucose homeostasis and various treatment technologies for regulation of glucose concentration. Development of mathematical models describing the dynamics of glucose and insulin concentration variations, blood glucose concentration measurement and inference techniques, insulin pumps, and artificial pancreas systems.
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 418
Chemical and Biological Engineering Laboratory II
Laboratory work in distillation, humidification, drying, gas absorption, filtration, and other areas.
Prerequisite(s): CHE 302 and CHE 317
Lecture: 1 **Lab:** 3 **Credits:** 2
Satisfies: Communications (C)

CHE 423
Chemical Reaction Engineering
Introduction to the fundamentals of chemical kinetics. The design, comparison, and economic evaluation of chemical reactors. Emphasis on homogeneous systems.
Prerequisite(s): CHE 302 and CHE 351 and CHE 433
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 426
Statistical Tools for Engineers
Descriptive statistics and graphs, probability distributions, random sampling, independence, significance tests, design of experiments, regression, time series analysis, statistical process control, and introduction to multivariate analysis.
Prerequisite(s): MATH 151
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 433
Process Modeling and System Theory
Principles of process modeling. Modeling of non-reactive and reactive dynamic processes. Transfer functions. Modeling of multistage and non-linear processes. Discrete-event processes, Markov processes, and automata theory.
Prerequisite(s): CHE 302 and CHE 351
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 435
Process Control
Dynamic process models, stability assessment, feedback, and feed forward control strategies, design and tuning of closed-loop controllers, time domain and frequency domain design and performance assessment methods. Multivariable systems, interaction, multi-loop control. Software for process simulation and controller design.
Prerequisite(s): CHE 302 and CHE 433
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 439
Numerical and Data Analysis
Utilization of numerical methods to find solutions to a variety of chemical engineering problems. Emphasis placed on problem formulation, development of computer code, and interpretation of results. Techniques covered include: systems of algebraic equations, linear regression, and statistics. Numerical differentiation and integration, solution of ordinary and partial differential equations.
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 451
Thermodynamics II
Second law analysis of cooling, separation, combustion, and other chemical processes. Chemical reaction equilibrium and processing applications.
Prerequisite(s): CHE 351
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 455
Polymer Processing
Considerations of transport processes in the polymer industry. Analysis of heat, mass, and momentum transfer in molten polymers and polymer solutions. The polymer flow processes to be discussed will include: extrusion, calendaring, fiber spinning, injection molding, mixing, and polymerization reaction.
Prerequisite(s): CHE 302 and CHE 301
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 465
Electrochemical Energy Conversion
Thermodynamics, kinetic and mass-transfer fundamentals of electrochemical devices. Potential and potential measurement. Batteries and fuel cells. Fundamentals of corrosion and corrosion prevention.
Prerequisite(s): CHE 302
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 467
Fuel Cell System Design
System or chemical reactor perspective of fuel cell design. Macro-scale modeling of fuel cell applications. Description of electrode/electrolyte assemblies and the three phase region, polarization curve characterization, analysis of continuous flow systems, typical fuel cell stack configurations, analysis of spatial non-uniformities in stacks, and balance of plant design.
Prerequisite(s): CHE 423
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 470
Introduction to Polymer Science
An introduction to the basic principles that govern the synthesis, processing and properties of polymeric materials. Topics include classifications, synthesis methods, physical and chemical behavior, characterization methods, processing technologies and applications. Same as CHEM 470 and MMAE 470.
Prerequisite(s): CHEM 124 and MATH 251 and PHYS 221
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 489
Fluidization
Regimes of fluidized beds, rheology behavior of fluidized beds, particle classification, properties of the bubble, emulsion, elutriation, and jet. Fluid mechanic theory and heat and mass transfer in fluidized beds. Design aspects of fluidized beds and pneumatic conveying. Industrial applications of fluidized beds (catalytic reactors, drying, coal conversion, waste treatment).
Prerequisite(s): CHE 302
Lecture: 3 **Lab:** 0 **Credits:** 3

CHE 491
Undergraduate Research
Students undertake an independent research project under the guidance of a chemical and biological engineering faculty member.
Credit: Variable

CHE 494
Process Design I
Introduction to design techniques and economic aspects of chemical processes. The technical and economic aspects of equipment selection and design, and alternative methods of operation.
Prerequisite(s): CHE 423* and CHE 435* and CHE 451 and CHE 433, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

CHE 496
Process Design II
Group project in process design. Integration of technical, safety, environmental, economic, and societal issues in process development and design. Final part of the IPRO project package. Project teams consist of chemical engineering students and students from other disciplines and professions. Students from other academic units should register for designated section of IPRO 497 (three credits) and their contribution to the project tasks will be defined accordingly.
Prerequisite(s): CHE 494 and CHE 423* and CHE 435*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 2 **Credits:** 3
Satisfies: Communications (C)

CHE 497
Special Projects
Special projects.
Credit: Variable

CHE 498
Chemical Process Safety Design
The purpose of the course is to apply process design disciplines to integrate safety as a principal of the design process. Typical subjects are: thermodynamics of explosions, identification of process hazards, chemical reactivity hazards, dispersion models of release of toxic materials, fires and fire protection, and HAZOP and Fault Tree analysis.
Prerequisite(s): CHE 494
Lecture: 3 **Lab:** 0 **Credits:** 3

Chemistry (CHEM)

CHEM 100
Introduction to the Profession
Introduction to the chemical sciences, scientific method, computing tools, and interrelations of chemical sciences with biology, physics and other professions.
Lecture: 2 **Lab:** 0 **Credits:** 2
Satisfies: Communications (C)

CHEM 122
Principles of Chemistry I Without Laboratory
An introduction to the foundations of chemistry, including: atoms and molecules; stoichiometry of chemical reactions; thermochemistry; properties of gases; states of matter, chemical solutions; the molecular basis for chemical reactivity; atomic structure; periodicity; and chemical bonding.
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 123
General Chemistry Laboratory
General chemistry laboratory. The laboratory portion of CHEM 124.
Lecture: 0 **Lab:** 3 **Credits:** 1

CHEM 124
Principles of Chemistry I with Laboratory
An introduction to the foundations of chemistry, including: atoms and molecules; stoichiometry of chemical reactions; thermochemistry; properties of gases; states of matter, chemical solutions; the molecular basis for chemical reactivity; atomic structure; periodicity; and chemical bonding.
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

CHEM 125
Principles of Chemistry II with Laboratory
A continuing introduction to the foundations of chemistry, including: chemical equilibria; the chemistry of acids and bases; solubility and precipitation reactions; kinetics; thermodynamics; electrochemistry; nuclear chemistry; and the basics of organic chemistry.
Prerequisite(s): CHEM 124 or IIT Chemistry Placement score of 125
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

CHEM 126
Principles of Chemistry II Without Laboratory
Same as CHEM 125 except without the laboratory.
Prerequisite(s): CHEM 124 or CHEM 122
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 140
Principles of Chemistry II Lab
Laboratory portion of CHEM 125 (Principles of Chemistry II) covering Chemical Equilibria, the chemistry of acids and bases, solubility, and precipitation reactions. Introduction to thermodynamics and electrochemistry. Chemistry of selected elements and their compounds.
Prerequisite(s): CHEM 126
Lecture: 0 **Lab:** 4 **Credits:** 1

CHEM 235
Organic Chemistry I-Lecture
The constitution and properties of the different classes of organic compounds with considerable attention to stereochemistry and reaction mechanisms.
Prerequisite(s): CHEM 125 or CHEM 126
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 236
Organic Chemistry I-Lab
Introduction to the major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds from natural sources.
Prerequisite(s): CHEM 125 or CHEM 126
Lecture: 0 **Lab:** 4 **Credits:** 1

CHEM 237
Organic Chemistry I
The constitution and properties of the selected classes of organic compounds with considerable attention to stereochemistry and reaction mechanisms. The laboratory work involves the preparation of simple organic compounds using basic synthetic techniques.
Prerequisite(s): CHEM 125 or CHEM 126
Lecture: 3 **Lab:** 4 **Credits:** 4
Satisfies: Communications (C)

CHEM 239
Organic Chemistry II
Sequel to Organic Chemistry I with more emphasis on structure and reactivity of several classes of organic compounds including introductory discussion on common spectroscopic techniques.
Prerequisite(s): CHEM 237 or (CHEM 236 and CHEM 235)
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 240
Organic Chemistry Laboratory
Basic techniques for advanced organic preparations. Interpretation of scientific results including percent yield, melting point, boiling point, IR, and NMR spectra.
Prerequisite(s): CHEM 239*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 1 **Lab:** 4 **Credits:** 2
Satisfies: Communications (C)

CHEM 247
Analytical Chemistry
This course introduces students to the theory and applications of quantitative analytical chemistry. Topics covered include: statistical data analysis; equilibrium constants expressions; acid-base reactions; volumetric analysis; and fundamentals of spectroscopy, electrochemistry, and of separations science. Laboratory experiments include learning about analytical process, calibration of glassware and equipment, wet chemical analysis, electrochemistry, spectroscopy, and chromatography.
Prerequisite(s): CHEM 125
Lecture: 3 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

CHEM 321
Instrumental Analysis
This course introduces students to theory and application of modern instruments in chemical procedures. Standard spectroscopic methods including atomic spectrometry, molecular spectrometry, ultraviolet spectroscopy, molecular luminescence, Fourier transform infrared spectroscopy, and nuclear magnetic resonance spectroscopy. Separation techniques using high pressure liquid chromatography and gas chromatography. Other topics relevant to advanced chemical instrumentation.
Prerequisite(s): CHEM 247
Lecture: 3 **Lab:** 4 **Credits:** 4
Satisfies: Communications (C)

CHEM 343
Physical Chemistry I
Thermodynamic laws and relationships applied to chemical systems. Kinetic theory of gases. Equations of state for ideal and real gases. Calculation of state functions from arbitrary pathways using measurable partial derivatives. Chemical potential and the prediction of phase and reaction equilibria.
Prerequisite(s): (MATH 251 or MATH 252) and CHEM 125
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 344
Physical Chemistry II
Introduction to quantum mechanics. Applying quantum mechanics to chemical systems. Atomic structure and spectra. Molecular structure and spectroscopy. Statistical mechanics. Chemical kinetics. The laboratory will include experiments dealing with thermochemistry, phase equilibria, chemical kinetics, spectra, molecular structure, and treatment of data.
Prerequisite(s): (CHE 202 or CHEM 247) and CHEM 343 and MATH 252 and PHYS 221
Lecture: 3 **Lab:** 4 **Credits:** 4
Satisfies: Communications (C)

CHEM 410
Science of Climate Change
This course will focus on the science underlying global warming/climate change. How can we continue to lead the good life while living in harmony with nature? Although obviously important, commercial/political aspects are not considered here. However, any serious debate about climate change issues eventually has to rest on the underlying scientific facts so we need to be informed. Ultimately the sun is our primary source of power. How do we responsibly access that power in the short, intermediate and long terms? Bio-fuels, carbon dioxide, polar ice caps, and solar power are some of the topics to be discussed. Class time will be divided between lectures and recitation. Permission of instructor required.
Prerequisite(s): CHEM 124 or PHYS 221
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 415
Inorganic Chemistry
In-depth introduction to the vast subfield of the discipline dealing with all of the elements in the periodic table. Presents balanced blend of facts and theories in modern inorganic chemistry. Emphasis is on bonding, electronic, magnetic, and structural features exhibited by inorganic and organometallic compounds and their reactivities. Modern concepts including symmetry and group theory and their relevance in solving chemical problems. Bioinorganic chemistry and high tech inorganic materials and solids are introduced.
Prerequisite(s): CHEM 239
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 416
Advanced Chemistry Laboratory
This advanced laboratory emphasizes chemical synthesis and characterization of inorganic and organometallic compounds. Air and moisture-sensitive techniques are introduced and employed. The synthesis and characterization of nanomaterials is also featured.
Prerequisite(s): CHEM 240 and CHEM 415*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 1 **Lab:** 7 **Credits:** 3
Satisfies: Communications (C)

CHEM 434
Spectroscopic Methods in Identification and Analysis
Characterization and analysis by mass, vibrational, nuclear magnetic resonance, and electronic spectroscopy. Structure-spectra correlations applied to organic and inorganic compounds with examples drawn from diverse areas, e.g., pollutants, toxic materials, polymers, etc. The laboratory work includes characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods.
Prerequisite(s): CHEM 247 and CHEM 240
Lecture: 3 **Lab:** 4 **Credits:** 4

CHEM 438
Physical Biochemistry
The principles and techniques of thermodynamics, kinetics and spectroscopy applied to biological macromolecules will be introduced. Contents to be covered include: interpretation of entropy and enthalpy driven processes, intra- and intermolecular interactions, biochemical equilibrium, free energy driven protein and ion transport, DNA and protein stability, derivation of rate of reaction from reaction mechanism, enzyme kinetics, and principles and applications of spectroscopy in identifying the structures of proteins and nucleic acids.
Prerequisite(s): CHEM 239 and CHEM 343
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 450
Introduction to Research
Required for chemistry majors. Designed to give research experience in a faculty research laboratory.
Lecture: 0 **Lab:** 8 **Credits:** 3
Satisfies: Communications (C)

CHEM 451
Undergraduate Seminar
An overview of a variety of chemical information tools and major scientific databases for navigating primary scientific literature. There will be a focus on the written and oral presentation of scientific research and the critical evaluation of the same types of scientific communication. Professional development with discussions of behavior, ethics, and career paths.
Prerequisite(s): CHEM 125
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 452
Cheminformatics
This course provides an introduction to chemical informatics and an overview of computer technology and computational methods for search, visualization, analysis, management, and mining of chemical and biochemical data and information. Potential topics include: representation of 2D and 3D chemical structures and chemical reactions; molecular coding; chemical structure database; chemical data and structure descriptors; data visualization and non-linear mapping; database design and management; chemical and biological data analysis and mining; cluster and diversity analysis; and software design and programming; cheminformatics in chemical reaction and property, analytical chemistry, and spectral analysis.
Prerequisite(s): CHEM 343 and CHEM 237
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 454
Computational Quantum Chemistry
A project-based introduction to modern quantum chemistry tools and approaches. Basics of quantum mechanics and Perturbation Theory. Self-Consistent Field Approximation (Hartree-Fock and density functional approximations, post-HF-methods). Concept of orbital interactions (perturbational MO theory. intermolecular perturbations, constructing MO from fragment orbitals). Electronegativity and geometry perturbations. Walsh Diagrams. First and second order Jahn-Teller effects. Analysis of chemical reactivity, clarification of reaction mechanisms, and predicting physical properties associated with molecules. This course will include laboratory work.
Prerequisite(s): CS 105 and MATH 152 and CHEM 344
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 455
Advanced Organic Chemistry
This course provides knowledge on classical and modern organic chemistry at the advanced undergraduate and graduate level. Mechanism and theory of organic reactions, synthetic methodology, and total synthesis will be covered.
Prerequisite(s): CHEM 239
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 456
Computational Biochemistry and Drug Design
A project-based introduction to computer-aided drug design tools and the principles behind them. Molecular docking and molecular mechanics force fields for binding enthalpies. Continuum dielectric models of electrostatics and solvation. The Boltzmann distribution and alchemical binding free energy calculations. Quantitative structure property relationships, including for activity and membrane permeability. This course will include laboratory work.
Prerequisite(s): CHEM 237
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 460
Bioanalytical Chemistry
This course will provide an introduction to analysis of biomolecules and biologically active molecules and cover analytical and spectroscopic methods for characterization, separation, and detection of biomolecules and biologically active molecules. Students will learn chemical, biochemical, biophysical, chromatographic, electrochemical, and instrumental techniques for detection, qualitative and quantitative analysis, and characterization of small drugs, biomolecules, bioconjugates, biosimilars, and biopharmaceuticals including protein, antibodies, nucleic acid, and enzymes. Potential topics includes acid-base chemistry, chemical kinetics and thermodynamics, biomolecular structure, enzyme and protein chemistry, bioconjugate chemistry, spectroscopy, mass spectrometry, fluorescence microscopy, chromatography, electrochemistry, and analysis and characterization of proteins and nucleic acids.
Prerequisite(s): CHEM 237 and CHEM 343 and CHEM 247
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 461
Bioanalytical Chemistry Laboratory
In this laboratory course of bioanalytical chemistry, students will learn chemical, biochemical, and instrumental lab techniques for detection, analysis, separation, and characterization of small drugs, bioactive agents, and biomolecules. Students will gain hands-on lab experience in the biochemical assays, microscopic, and spectroscopic analysis of biologically active molecules including small drugs, proteins, and DNAs. Potential topics include instrumental and spectroscopic analysis using FTIR, Raman, UV-visible, fluorescence, NMR, AFM, ICP, HPLC, calorimetry, fluorescence microscope, and mass spectrometry; DNA and protein electrophoresis; chromatographic separation; immunoassay; DNA profiling; peptide sequencing; PCR; centrifugation; and microdialysis; and statistical analysis.
Prerequisite(s): CHEM 237 and CHEM 343 and CHEM 247
Lecture: 1 **Lab:** 7 **Credits:** 3

CHEM 463
Analytical Method Development Laboratory
In this laboratory course, students will learn about method development and assessment for analysis of chemicals, organic compounds, polymers, drugs, pharmaceuticals, and biopharmaceuticals. Students will gain hands-on experience in quantitative analysis and quality assurance and control of diverse chemicals and bioactive agents. This course will foster students to develop quantitative and technical analysis techniques, literature comprehension, critical thinking, problem-solving, and communication skills. The literature and guidance on analytical method development and validation reported by the industry and government agencies will be studied. Potential topics include: analytical separation; instrumental analysis; chromatographic and electrophoretic methods; quality assurance and control; analytical method validation; sampling, preparations and storage of samples and standard solutions; physiochemical characterization; statistical analysis; good laboratory practice (GLP) requirement; and validation, verification, and documentation of analytical testing methods and procedure.
Prerequisite(s): CHEM 237 and CHEM 343 and CHEM 247
Lecture: 1 **Lab:** 7 **Credits:** 3

CHEM 467
Medicinal Chemistry
This course will provide an introduction to medicinal chemistry. Potential topics include organic chemistry in drug design and drug action; structure-activity relationship (SAR); mechanism of drug action; pharmaceutical analysis and formulation; binding affinity, selectivity, and specificity; drug efficacy, toxicity, and oral bioavailability; drug absorption, distribution, metabolism and excretion (ADME); pharmacokinetics (PK); pharmacodynamics (PD); interaction of drugs with enzymes, protein receptors, DNAs, and RNAs; protein-protein interaction; enzyme inhibition and mechanism; molecular target identification and detection; prodrugs; biologics; antibody-drug conjugate (ADC) chemistry; drug discovery process; development of therapeutics, diagnostics, and theranostics; pharmaceutical and clinical data analysis; case studies of preclinical and clinical trials.
Prerequisite(s): CHEM 343 and CHEM 239
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 470
Introduction to Polymers
Introductory course covering fundamental aspects of polymers with major emphasis on synthesis, polymerization mechanisms, chain architecture, relationship between polymer structures and properties, measurement and control of molecular weights, thermal and mechanical properties, and polymer processing.
Prerequisite(s): CHEM 239
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 472
Environmental Chemistry
This course provides an introduction to environmental chemistry and is focused on application of chemical principles and theories to the study of environmental phenomena and issues and covers matters related to environment and earth. Potential topics include aquatic chemistry, water pollution and purification, atmospheric chemistry, air pollution, hydrology and geochemistry, soil chemistry and pollution, natural resource and cycle, energy and sustainability, climate change, chemical bonding and reactions, thermodynamics and kinetics, acid-base chemistry, redox chemistry, bio-inorganic chemistry on earth and living systems, organic and inorganic toxicants and pollutants, hazardous heavy metals, nuclear wastes, waste and recycling, green chemistry, environmental toxicology, and chemical and environmental health and safety.
Prerequisite(s): (CHEM 125 or CHEM 126) and CHEM 247
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 473
Environmental Analytical Chemistry
This course provides an overview of applications of analytical chemistry to environment and environmental problems. Students will learn spectrometric, chromatographic, electrochemical measurement methods and concepts for analysis of environmental samples and tracing and monitoring of environmental problems. Potential topics include: quality assurance (QA) and quality control (QC) in environmental sampling and analysis; determination of trace elements, toxicants, organics, pollutants, heavy metals, and radionuclides in environmental samples and drinking water; analytical tools for tracing and monitoring of pollution and contamination; instrumental analysis of environmental samples using ICP-MS (inductively coupled plasma-mass spectrometry), ICP-AAS (atomic absorption spectroscopy), ICP-AES (atomic emission spectrometry), ion chromatography, and gas chromatography (GC), GC-MS, high performance liquid chromatography (HPLC); chemometrics; electrochemical methods; GC/LC separation methods, liquid-liquid and solid phase extraction; statistical data analysis.
Prerequisite(s): (CHEM 125 or CHEM 126) and CHEM 247
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 475
Forensic Chemistry
This course will provide an introduction to forensic chemistry and prepare students to build a sound knowledge in chemical, biochemical, and instrumental methods for forensic analysis and statistical analysis of forensic data. The class will cover principles and applications of chemical, biochemical, spectroscopic, and chromatographic methods for analysis and characterization of forensic samples. Potential topics include forensic applications of UV-Visible, IR, Raman, NMR, atomic absorption (AA) spectroscopy, fluorescence microscopy, X-ray, mass spectrometry; chromatographic methods (GC, HPLC, and TLC) and capillary electrophoresis for separation of forensics; analysis and identification of enforced drugs; colorimetric methods; microscopy and immunoassays for forensic examination; chemistry in examination and analysis of chemical, biological, and physical forensic samples (alcohol, carbon monoxide, papers, hair, gunpowder, inks, fibers, paints, firearms, fingerprint, palmprint, documents, and body fluid and blood samples); crime lab services; forensic statistics; introduction to international forensic databases.
Prerequisite(s): CHEM 237 and CHEM 343 and CHEM 247
Lecture: 3 **Lab:** 0 **Credits:** 3

CHEM 476
Forensic Chemistry Laboratory
This lab course will cover chemical, spectroscopic, and chromatographic methods for analysis and characterization of forensic samples. Students will gain hands-on lab experience in instrumental, colorimetric, and microscopic analysis of forensic samples, controlled substances, and standards. Potential topics include: colorimetric assay for identification and quantification of illicit drugs; fingerprint chemistry; IR, Raman, Fluorescence, and NMR-based spectroscopic analysis of controlled substances, forensic samples, and gold standards; GC-MS, HPLC, and TLC for detection and separation of forensic samples; spot testing and microscopic analysis and characterization of biologic fluids and forensic samples; construction of calibration curves; analysis of forensic samples using an international database including paint data query (PDQ), NIST's Forensic database trace evidence table, international ink library, glass evidence reference; introduction to visualization software.
Prerequisite(s): CHEM 237 and CHEM 343 and CHEM 247
Lecture: 1 **Lab:** 7 **Credits:** 3

CHEM 485
Chemistry Colloquium
Lectures by prominent scientists. This course exposes students to current and active research in chemistry both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to the academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.
Prerequisite(s): CHEM 239
Lecture: 0 **Lab:** 1 **Credits:** 1

CHEM 487
Senior Thesis in Chemistry
Original work carried on by the student under the guidance of a staff member. A careful search of the literature is required before the study is begun, and continued reference to the chemical literature is expected as the work progresses. A written report is required.
Prerequisite(s): CHEM 450
Lecture: 0 **Lab:** 12 **Credits:** 4
Satisfies: Communications (C)

CHEM 491
Undergraduate Research
Student participation in undergraduate research, usually during the junior or senior year.
Credit: Variable
Satisfies: Communications (C)

CHEM 495
Seminar in Special Topics
This seminar course is designed to provide students with opportunities to learn about recent development in specialized chemistry areas including bioanalytical chemistry, environmental chemistry, forensic chemistry, medicinal chemistry, and computational chemistry and biochemistry. Students are expected to develop written and oral communication skills on the advanced and specialized topics. Prerequisites or Instructor Approval.
Prerequisite(s): CHEM 125 or CHEM 126
Lecture: 1 **Lab:** 0 **Credits:** 1

CHEM 497
Special Projects
For juniors and seniors.
Credit: Variable
Satisfies: Communications (C)

Civil and Architectural Engr (CAE)

CAE 100
Introduction to Engineering Drawing and Design
Introduction to engineering graphics as a problem-solving tool. Basic traditional techniques of orthographic projection, multi-view, pictorial, auxiliary views, dimensioning and tolerance, sectioning, detail drawing. Use of ANSI standards; applications in civil, architectural, and engineering design.
Lecture: 1 **Lab:** 2 **Credits:** 2
Satisfies: Communications (C)

CAE 101
Introduction to AutoCAD Drawing and Design
A continuation of CAE 100. Use of PC-based CAD (Computer-Aided Drawing and Design) software for presentation and problem solving in civil and architectural engineering applications. Introduction to basic principles of design.
Prerequisite(s): CAE 100
Lecture: 1 **Lab:** 2 **Credits:** 2
Satisfies: Communications (C)

CAE 105
Geodetic Science
Measurement of distances and angles. Theory of errors. Study of leveling, traversing, topographic mapping, route surveying, earthwork computation, photometry, and boundary surveys. Practice in the use of tapes, levels, total stations, and PC-based methodology.
Prerequisite(s): CAE 100*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 3 **Credits:** 3

CAE 110
Professional Practice I
This course is an introduction to the engineering profession. The content and delivery have been designed to challenge the student's perspective of oneself and thus make the student a better engineer. The class focus is on developing the skills to become a professional learner and a successful student, increasing team learning skills, self-reflection, enhancing ethical perception and decision making abilities, and understanding the responsibilities as an engineer. In simple terms, the student will begin to "act as an engineer acts."
Lecture: 1 **Lab:** 0 **Credits:** 1

CAE 111
Professional Practice II
This course continues the introduction to the engineering profession with further studies of team learning, specializations in engineering, enhancing ethical perception and decision making abilities, and understanding the responsibilities as an engineer. The course also looks deeply at the need for continuous innovation by studying and practicing the entrepreneurial mindset needed to create value for oneself as the student, for one's company, and for society. In simple terms, the student will begin to "act as an engineer acts" and "think like an entrepreneur thinks."
Lecture: 1 **Lab:** 0 **Credits:** 1

CAE 208
Thermal-Fluids Engineering I
Basic principles of thermodynamics applied to engineering systems using pure substances and mixtures as working fluids. Direct application of the laws of thermodynamics to analysis of closed and open systems, mass and energy flow. Extensive analysis of isentropic processes in cycles, analysis of gas mixtures and psychometrics in heating and cooling systems. Introduction to fluid mechanics and analysis of fluid statics problems.
Prerequisite(s): CHEM 124 and PHYS 123 and MATH 251* and CS 104-105, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 209
Thermal-Fluids Engineering II
Complete the development of fluid mechanics and introduce and develop heat and mass transfer analysis techniques. Description and analysis of fluid kinematics, energy and momentum equations applied to internal/external flow in building engineering systems. Development and application of convection, conduction and radiation to one-, two- and three-dimensional systems in steady state and transient regimes of operation as applied to building materials and geometries.
Prerequisite(s): MATH 252* and CAE 208, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 221
Engineering Geology
Geology and its relationship to civil engineering; minerals; rocks; soil formation; geologic structure; groundwater hydraulics; frost action in soils, landslides, shoreline erosion, bluff instability; earthquakes; air photo interpretation, soil and rock mechanics in relation to engineering geology; subsurface exploration; dams, reservoirs, tunnels; case-history illustrations.
Lecture: 2 **Lab:** 2 **Credits:** 3

CAE 286
Theory and Concept of Structural Mechanics
Equilibrium for particles and rigid bodies. Distributed forces, centroids, centers of gravity, and moments of inertia. Free body diagrams. Application to truss structures. Kinetics of particles: Newton's Laws of motion, energy, and momentum. Kinematics of particles.
Prerequisite(s): PHYS 123 and MATH 152
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 287
Mechanics of Structural Materials
The concepts of deformation, strain, and stress. Application of free body diagram in shear force and bending moment diagram. Elementary bending theory, normal and shear stresses in beams, and beam deflection. Axially loaded members and Euler buckling theory. Plane stress and strain, Mohr's circle, and torsion of circular sections. Combined loading.
Prerequisite(s): CAE 286 or MMAE 200
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 302
Fluid Mechanics and Hydraulics
Fundamental concepts; fluid statics; properties of fluid in motion; fluid flows through orifices, weirs and venturi meters; laminar and turbulent flow in closed conduits; flow in open channels; turbo machinery; measurement in fluid mechanics and hydraulics.
Prerequisite(s): MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 303
Structural Design I
Design loads, factors of safety; load and resistance factors for steel structures. Experimental and analytical study of steel materials subjected to various states of stress. Failure theories, yield and post-yield criteria are treated. Fatigue and facture mechanics phenomena are related to design practice. The design of tension member, beams, and columns in steel.
Prerequisite(s): MMAE 202 or CAE 287
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 304
Structural Analysis I
The analysis of statically determinate trusses and frames. Determination of internal forces and calculation of deflections. Application of the principle of virtual work and energy methods. Column stability.
Prerequisite(s): MATH 252 and (MMAE 202 or CAE 287)
Lecture: 2 **Lab:** 2 **Credits:** 3

CAE 307
Structural Design II
Design loads, factor of safety, load and resistance factors for concrete structures. Properties of concrete-making materials and the proportioning of concrete mixtures. Experimental and analytical study of plain and reinforced concrete subjected to various states of stress. Failure theories and the ultimate strength of plain and reinforced concrete structural components. The design of beams, columns, and slabs in reinforced concrete.
Prerequisite(s): CAE 315* and CAE 304, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C), CAE Design Course (D)

CAE 312
Engineering Systems Analysis
Systems concept process, interest rate, present and future worth values, evaluation of alternatives, and elements of microeconomics. Theory of probability, laws of probabilities, random variables and distribution functions, functions of random variables, statistical estimations of data, mean and standard deviation, correlation, and regression analysis.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 315
Materials of Construction
Physical principles of elastic and plastic deformation of construction. Mechanical testing methods including tensile, compressive, toughness, creep and fatigue. Properties of concrete, wood, iron and steel and other construction materials. The emphasis is on concepts from solid mechanics which explain the behavior of materials to the extent needed in the design of load-bearing constructs.
Prerequisite(s): MMAE 202 or CAE 287
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

CAE 323
Introduction to Geotechnical Engineering
Physical and mechanical properties of soil; elementary principles of soil identification and testing. Principles of soil permeability and seepage, consolidation, failure theories, earth pressures, and bearing capacity. Laboratory included.
Prerequisite(s): (CAE 209 or CAE 302) and (CAE 287 or MMAE 202)
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

CAE 331
Building Science
Study of the physical interaction of climate (humidity, temperature, wind, sun, rain, snow, etc.) and buildings. Topics include psychrometrics, indoor air quality, indoor thermal comfort, heat transfer, air infiltration, solar insolation, and heating and cooling load calculation.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 383
Electrical and Electronic Circuits
Introduction to electrical and electronic circuits. AC and DC steady state and transient network analysis. Phasors, AC and Three Phase Power. Diodes, transistors, and operational amplifiers.
Prerequisite(s): MATH 252 and PHYS 221
Lecture: 2 **Lab:** 2 **Credits:** 3

CAE 401
Hydraulics, Hydrology, and Their Applications
Collection and distribution of water. Flow of fluids through orifices, weirs, venturi meters. Laminar and turbulent flow in closed conduits. Open channel flow. Model analysis using the principles of dimensional analysis. Rainfall and runoff.
Prerequisite(s): MATH 252*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 3 **Credits:** 3

CAE 402
Introduction to Environmental Engineering and Sustainable Design
This course provides an overview of how environmental engineers integrate biological, chemical, and physical sciences with engineering design methods to develop solutions to environmental problems. Topics include air pollution, water pollution, solid waste management, fate and transport of contaminants, pollution prevention, environmental regulation, risk assessment, climate science, and sustainability assessment. Focuses on applications and actual design practice.
Prerequisite(s): CHEM 124 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 408
Bridge and Structural Design
Design of modern bridges, bridge design requirements, LRFD approach, seismic and wind effects, fatigue in bridges, support design.
Prerequisite(s): CAE 431*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 410
Introduction to Wind and Earthquake Engineering
Kinematics of Particles, Newton's laws of motion, energy and momentum. Kinematics of rigid bodies. Fundamentals of free, forced, and transient vibration of single and multi-degree of freedom structures. Analysis and design of structures for wind and earthquake loadings. Building code requirements. Instructor's consent may be granted to students who do not meet the prerequisite.
Prerequisite(s): CAE 411*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 411
Structural Analysis II
The analysis of statically indeterminate frames. Application of classical methods including superposition, slope deflection, and moment distribution. Introduction to the direct stiffness method and computer analysis of structures.
Prerequisite(s): CAE 304
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 412
Traffic Engineering Studies and Design
Basic traffic engineering studies including traffic volume, speed, accident, and parking studies. Capacity and analysis for various traffic facilities. Design of traffic control devices.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 415
Pavement Design, Construction and Maintenance
Pavement types, stresses in flexible and rigid pavements, vehicle pavement interaction. Mathematical models for pavement systems, sub grade support, design of flexible and rigid pavements. Construction procedure, drainage considerations, environmental effects. Rehabilitation and maintenance of pavements.
Prerequisite(s): CAE 323
Lecture: 3 **Lab:** 3 **Credits:** 4

CAE 416
Facility Design of Transportation Systems
Design and analysis of facilities of transportation systems. Integration of select transportation components and their interrelationships. Design of specific facilities: guide ways, terminals, and other elements for railroads, airports, and harbors.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 417
Railroad Engineering and Design
History of railroad industry. Train operation, train make-up, and handling. Design and analysis of railroad track structure, track irregularities, and their representation. Vehicle/track interaction and dynamic problems associated with it. Performance of railway vehicles.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 419
Introduction to Transportation Engineering and Design
Highway functions, design controls and criteria, element of design, cross-section elements, local roads and streets, at-grade intersections, grade separation and interchanges, highway capacity analysis, and introduction to pavement management.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 421
Risk Assessment Engineering
Description and concept of risk, relationship between the likelihood of loss and the impact of loss, engineering hazards assessment and risk identification and evaluation using fault tree analysis, failure mode and effect analysis, etc., risk analyses applications with practical statistics.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 422
Sprinklers, Standpipes, Fire Pumps, Special Suppression, and Detection Systems
Review and introduction to fluid dynamics applied to sprinklers, standpipes, fire pumps, and special suppression systems; hydraulic design criteria and procedures for sprinklers requirements, standpipes, fire pumps, special suppression systems, and detection and alarm systems using nationally recognized design (National Fire Protection Association) standards, water supply requirement systems and distributions.
Prerequisite(s): CAE 209 or CAE 302
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 424
Introduction to Fire Dynamics
Introduction to fire, physics and chemistry, and mass and heat transfer principles, fire fluid mechanic fundamentals, fundamentals and requirements of the burning of materials (gases, liquids, and solids), fire phenomena in enclosures such as pre-flashover and post-flashover.
Prerequisite(s): CAE 209
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 425
Fire Protection and Life Safety in Building Design
Fundamentals of building design for fire and life safety. Emphasis on a systematic design approach. Basic considerations of building codes, fire loading, fire resistance, exit design, protective systems, and other fire protection systems.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 430
Probability Concepts in Civil Engineering Design
Introduction to probability, modeling, and identification of nondeterministic problems in civil engineering. Development of stochastic concepts and simulation models and their relevance to design and decision problems in various areas of civil engineering.
Prerequisite(s): MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 431
Steel Design
Design of steel beams, plate girders, and beam columns. Bolted and welded connections. Design of typical frame systems.
Prerequisite(s): CAE 303 and CAE 304 and CAE 315*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 432
Concrete and Foundation Design
Design of reinforced concrete building frames and continuous structures. Design of girders, slabs, columns, foundations, and retaining walls.
Prerequisite(s): CAE 307*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 433
Repair of Existing Building Structures
Building repair and retrofit issues are discussed. Specific requirements of a building for repair and/or reconstruction are emphasized. Methods of assessing building conditions, including forensic structural engineering are covered. Repair and strengthening methods based on types of materials (steel, concrete, masonry, timber), occupancy and function (residential, commercial), and building values are covered along with demonstration case studies and illustrative examples.
Prerequisite(s): CAE 432 and CAE 431
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 435
Experimental Analysis of Structures
The analysis of structures (prototypes) with the aid of models constructed from metal, wood, plastics, and other materials. Geometrical, mathematical, demonstration, graphical and direct and indirect models will be treated. Comparisons of experimental results with results from computer models will be made. Similitude and the theory of models will be treated. Individual and group project work will be emphasized.
Prerequisite(s): CAE 304 and CAE 411
Lecture: 2 **Lab:** 2 **Credits:** 3

CAE 436
Design of Masonry and Timber Structures
Design of unreinforced and reinforced masonry structural elements and structures. Serviceability and ultimate capacity design. Seismic response, resistance, and design. Design of wood columns and bending members. Mechanical fasteners and connectors. Instructor's consent may be granted to students who do not meet the prerequisite.
Prerequisite(s): CAE 307
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 437
Homeland Security Concerns in Engineering Systems
Review of blast effects produced by solid phase weapons and their effects on structures and people. Estimation of the risk of threats to security of public and private systems and facilities. Review of simplified structural methods for the analysis and design of structures to meet homeland security concerns and procedures to minimize casualties. Analysis of post-attack fires and how to prevent them. Examination of potential risk to security of infrastructure systems. Development of contingency plans to include evacuation preparedness at time of emergency.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 438
Control of Building Environmental Systems
Introduction to automatic control systems. Control issues related to energy conservation, indoor air quality and thermal comfort in buildings. Classification of HVAC control systems. Control systems hardware: selection & sizing of sensors, actuators & controllers. Practical HVAC control systems; elementary local loop and complete control systems. Case studies. Computer applications.
Prerequisite(s): CAE 331 or CAE 513 with min. grade of C or MMAE 322
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 439
Introduction to Geographic Information Systems
Geographic information system (GIS) technology allows databases which display and query information in new ways. This course will teach general GIS and GPS skills and concepts, useful to students and practitioners in a variety of disciplines. Students will complete a final GIS project relevant to their field of study. This hands-on class will use ESRI's Arc View and Spatial Analyst products, as well as Trimble GeoExplorer GPS units.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 453
Measurement and Instrumentation in Architectural Engineering
Hands-on experience with energy and indoor air quality measurements in buildings including experimental design, data analysis, and experimental statistics. Measurements and techniques covered include: thermal performance (e.g., thermal conductivity and resistance, heat flux, and temperature); fluid flows and HVAC characteristics (e.g., velocity, pressure, and airflow); energy performance (e.g., current, voltage, and power draw); whole building diagnostics (e.g., blower door and duct blaster); and indoor air quality (e.g., tracer gas techniques for air exchange, particle measurements, and gas measurements). Course combines lectures and field measurements in buildings on campus.
Prerequisite(s): CAE 331
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 457
Geotechnical Foundation Design
Methods of subsoil exploration. Study of types and methods of design and construction of foundations for structures, including single and combined footings, mats, piles, caissons, retaining walls, and underpinning. Drainage and stabilization.
Prerequisite(s): CAE 302 and CAE 323
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 461
Plumbing and Fire Protection Design
Study of plumbing systems, water supply, and venting systems. Study of fire protection systems for buildings including pipe sizing, pumps, sprinklers, gravity and pressure vessels, and controls.
Prerequisite(s): CAE 302 or CAE 209 or MMAE 313
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 463
Building Enclosure Design
Design of building exteriors, including the control of heat flow, air and moisture penetration, building movements, and deterioration. Study of the principle of rain screen walls and of energy conserving designs. Analytical techniques and building codes are discussed through case studies and design projects.
Prerequisite(s): CAE 331
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 464
HVAC Systems Design
Study of the fundamental principles and engineering procedures for the design of heating, ventilating, and air conditioning systems; HVAC system characteristics; system and equipment selection; duct design and layout. Attention is given to energy conservation techniques and computer applications.
Prerequisite(s): CAE 331 or CAE 513 with min. grade of C or MMAE 313 or MMAE 320
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 465
Building Energy Conservation Technologies
Identification of the optimal energy performance achievable with various types of buildings and service systems. Reduction of infiltration. Control systems and strategies to achieve optimal energy performance. Effective utilization of daylight, heat pumps, passive and active solar heaters, heat storage and heat pipes in new and old buildings.
Prerequisite(s): CAE 331 or CAE 531
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 466
Building Electrical/Lighting Systems Design
Study of the analysis and design of electrical systems in buildings utilizing the National Electric Code. Topics include AC, DC, single-phase and three-phase circuits, transients, branch circuits, panel boards, system sizing, fault calculations and overcurrent protection design. Also studies the design and specification of emergency power backup and alternative power systems.
Prerequisite(s): CAE 383 or (ECE 216 and ECE 215)
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 467
Lighting Systems Design
An intensive study of the calculation techniques and qualitative aspects of good luminous design. Topics covered include: photometric quantities and color theory, visual perception, standards, daylight and artificial illumination systems, radiative transfer, fixture and lamp characteristics, control devices, and energy conservation techniques. Design problems, field measurements, computer, and other models will be used to explore major topics.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 468
Architectural Design
Architectural Design is the first of a two-part sequence of architectural design and planning for architectural engineers. Students learn the basic theory and practice of the architectural design process from the architect's perspective. Topics include the logical process of architectural design development, integration of code requirement, design approach, and architectural presentation techniques taught through lecture and lab instruction.
Lecture: 2 **Lab:** 2 **Credits:** 3

CAE 470
Construction Methods and Cost Estimating
The role of estimating in construction contract administration. Types of estimates. Unit costs and production rates; job costs. Preparing bid for complete building project using manual methods and the CSI format; checking quantity take-off and cost estimating in selected divisions using a computer package.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), CAE Design Course (D)

CAE 471
Construction Planning and Scheduling
Planning, scheduling, and progress control of construction operations. Critical Path Method and PERT. Resource leveling of personnel, equipment, and materials. Financial control/hauling of construction projects. Impact of delay on precedence networks. Construction contract administration. Computer applications.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 472
Construction Site Operation
Construction site layout and mobilization. Liabilities of the parties. Methods of construction. Concrete form design and fabrication. Scaffolding, temporary facilities, and equipment. Safety on sites. Introduction to construction productivity.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 473
Construction Contract Administration
Characteristics of the construction industry. Project delivery systems. Duties and liabilities of the parties at the pre-contract stage. Bidding. Contract administration including duties and liabilities of the parties regarding payments, retainage, substantial and final completion, scheduling and time extensions, change orders, changed conditions, suspension of work, contract termination, and resolution of disputes. Contract bonds. Managing the construction company. Labor law and labor relations.
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 482
Hydraulic Design of Open Channel Systems
Uniform flow design; backwater profiles in natural streams; gradually varied flow practical problems; spatially varied flow; flow through nonprismatic and nonlinear channels; gradually varied unsteady flow; rapidly varied unsteady flow; flood routing; numerical solutions of open channels.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

CAE 486
Soil and Site Improvement
Theory of water flow through porous media. Site improvement techniques including grading and drainage, dewatering, reinforcement, and slurry trenches. Soil improvement techniques including replacement, in situ compaction, preloading and subsurface drainage, grouting, freezing, prewetting, and heating.
Prerequisite(s): CAE 323
Lecture: 3 **Lab:** 0 **Credits:** 3

CAE 491
Undergraduate Research
Special research problems in civil and architectural engineering under individual supervision of instructor. Seminar presentation is required. (Credit: Variable; maximum 4 credit hours). Prerequisite: Senior standing, minimum GPA of 3.0, and consent of the instructor.
Credit: Variable

CAE 495
Capstone Senior Design
A group project requiring the integration of multiple engineering disciplines to satisfy client requirements for a real engineering project. Students will be required to demonstrate mastery in the application of numerous engineering disciplines to a project, work as a member of an integrated engineering team, and demonstrate the ability to understand and communicate engineering solutions to a client verbally, visually, and in written form. Course is required to satisfy ABET program objectives.
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C), CAE Design Course (D)

CAE 497
Special Project
Special design project under individual supervision of instructor. Prerequisite: Senior standing, minimum GPA of 3.0, and consent of instructor.
Lecture: 0 **Lab:** 0 **Credits:** 4

Communications (COM)

COM 101
Writing in the University
A study of the use of writing, reading, and discussion as a means of discovering, questioning, and analyzing ideas, with an emphasis on audience, context and the use of revision. This course satisfies the Basic Writing Proficiency Requirement. It does not satisfy a general education requirement in the Humanities and Social or Behavioral Sciences.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 111
Writing in the University for Non-Native Students
Designed to deal with the special writing problems of those students whose native language is not English. Equivalent to COM 101. This course satisfies IIT's Basic Writing Proficiency Requirement. It does not satisfy a general education requirement in the humanities and social or behavioral sciences.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 125
Language and Culture I
The first of a two-semester sequence, this course and its sequel will introduce students to a particular language and culture, which will change annually. May be repeated for different languages. This course does not satisfy the HUM 102, 104, or 106 general education requirement.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 126
Language and Culture II
The second of a two-semester sequence, this course and its predecessor will introduce students to a particular language and culture, which will change annually. May be repeated for different languages. This course does not satisfy the HUM 102, 104, or 106 general education requirement.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 201
Digital Writing
The rhetorical theory and applied practice of digital writing. Topics include word processor alternatives, social media for professional development, multimedia writing, and collaboration and project management.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 225
Languages and Cultures III
Third-semester generic language and culture course designed to be applicable to various languages. Students should have already taken COM 126 in same language.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Humanities (H)

COM 226
Languages and Cultures IV
Fourth-semester generic language and culture course designed to be applicable to various languages. Students should have already taken COM 225 in the same language.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Humanities (H)

COM 301
Introduction to Linguistics
An introduction to the systematic study of language. Focus on the core areas of linguistics, such as sound patterns of language (phonology), form (syntax, morphology), and meaning (semantics, pragmatics), as well as applied areas, such as language, variation, language acquisition, psychology of language, and the origin of language.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 306
World Englishes
This course surveys dialects of English around the world, including the U.S., U.K., Canada, India, Africa, and the Caribbean, focusing on vocabulary, word and sentence formation, and sound patterning.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 307
The Self in Language
Explores the constructed nature of the self in literature and non-fiction prose. Special focus on the role of language in determining one's identity.
Lecture: 3 **Lab:** 0 **Credits:** 3

COM 308
Structure of Modern English
This course examines the structure of the English language from four different approaches: traditional-prescriptive, descriptive, generative, and contextual.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 309
History of the English Language
Beginning with basic concepts in language development, this course traces the evolution of modern English, from its Indo-European roots, through Germanic, Anglo-Saxon, Middle English and Early Modern English.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 310
The Human Voice: Description, Analysis and Application
Analysis of human and synthetic speech intended for technology mediated environments and devices. Focus on talker characteristics that affect speech intelligibility and social factors that affect talker characteristics. Attention to design characteristics of technology-mediated speech and how humans react to it.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 311
Linguistics for Technical Communication
This course examines linguistic theory as it relates to everyday problems. The course is divided into four sections, each of which exposes students to an application of these topics to broader issues. Topics include sound patterns of speech, sentence structure, meaning and language and society.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 315
Discourse Analysis
The analysis of language "flow" beyond sentence boundaries. Working with both spoken and written discourse, students will consider culture and gender-related patterns, and will apply findings from discourse analysis to communication problems in politics, education, healthcare, and the law.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 323
Communicating Science
This course focuses on strategies for communicating scientific information in professional and general settings. Students develop genre documents, learn how to adapt scientific information to various audiences, and complete exercises on style, grammar, and other elements of effective professional communication. Emphasis on usability, cohesion, and style in all assignments.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 330
Standards-Based Web Design
This course introduces the theory and practice of standards-based web design and development. The course focuses on an agile, incremental approach to building accessible, usable, and sustainable web pages that work across all modern browsers and web-enabled mobile devices. The course also provides a rhetorical and technological foundations for quickly establishing competencies in other areas of digital communication such as web application development.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 331
Web Application Development
A production-intensive course in applied theory and practice of developing web-based applications emphasizing interface and experience design using emerging Web standards and backend development using Ruby-based web application frameworks.
Prerequisite(s): COM 330
Lecture: 3 **Lab:** 0 **Credits:** 3

COM 333
App Programming Interfaces
A production-intensive course in the theory and applied practice of working with application programming interfaces (APIs), especially Web-available APIs for exchanging and mashing up content and data.
Prerequisite(s): COM 330
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 334
Literature of Modern Science
A study of the literature of science from the Renaissance to modern times.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 371
Persuasion
The study of covert and overt persuasion and their influences on society and individuals.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 372
Mass Media and Society
The history and structure of mass media, from print through film and broadcasting to the Internet, and their influences on American society.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 374
Communication in Politics
This course introduces students to the general theories and practices of political campaign communication today. It investigates how those rules and types apply in the current presidential campaign. More generally, the course teaches students to produce written and oral discourse appropriate to the humanities.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 377
Communication Law and Ethics
Explores ethical and legal issues concerning communication in diverse contexts, such as: the mass media - e.g. print, broadcast, and electronic; government and politics; organizational hierarchies - e.g. public and private sector workplaces; academic life - e.g. the classroom, student, and faculty affairs; and interpersonal relations - e.g. love, friendship, marriage.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 380
Topics in Communication
An investigation into a topic of current interest in communication, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 381
Topics in Communication
An investigation into a topic of current interest in communication, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 383
Social Networks
This course will discuss a variety of measures and properties of networks, identify various types of social networks, describe how position within and the structure of networks matter, use software tools to analyze social network data, and apply social network analysis to areas such as information retrieval, social media and organizational behavior.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 384
Humanizing Technology
This course will investigate and experiment with both conceptual and applied efforts to humanize technology. We will question the goals of humanization and its relationships to concepts such as design ethics and user-centered and emotional design. While the focus of the class will be on computer technology and programming languages, we will also look at humanization with regard to industrial design, engineering, architecture and nanotechnologies.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 401
Advanced Composition and Prose Analysis
Critical analysis of various types of prose, with stress on the art as well as the craft of writing. The student is required to write several critical papers.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 421
Technical Communication
Principles and practice in the communication of technical materials. Students work on the design, writing, and revising of reports, articles, manuals, procedures, proposals, including the use of graphics. Works by modern writers are analyzed.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 423
Communication in the Workplace
A study of communications relating to scientific, technological, and corporate structures. This course will help students develop workplace communication skills, including the ability to analyze situations, determine appropriate communications forms, write and revise work-related documents, and give oral presentations.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 424
Document Design
Principles and strategies for effective document and information design, focusing on print media. Students design, produce, and evaluate documents for a variety of applications, such as instructional materials, brochures, newsletters, graphics, and tables.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 425
Editing
Principles and practical applications of editing at all levels, working with both hard and soft copy and including copymarking, copyediting, proofreading, grammar and style, and comprehensive editing. Attention primarily to documents from science, technology, and business.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 428
Verbal and Visual Communication
Introduces students to the issues, strategies, and ethics of technical and professional presentations, and provides students with opportunities to engage in public address, video presentations and conferencing, and group presentations. Analysis of audience types and presentation situations, group dynamics, persuasive theories, language, and mass media.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 430
Introduction to Web Design and Management
Presupposing only that students know how to use a Web browser, this course teaches beginning HTML, basic page layout and design principles, basic multimedia, and the structure of Websites, and also introduces students to WYSIWYG Web page generation software and FTP software.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 431
Intermediate Web Design and Management
A continuation of COM 430, this course goes more deeply into HTML, multimedia, and some of the advanced features of WYSIWYG editors.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 432
Advanced Web Design and Management
A continuation of COM 430 and COM 431, this course covers the most current Web technologies.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 435
Intercultural Communication
An introduction to the problems of communication across cultures, with emphasis on the interplay of American civilization with those of other cultural areas.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 437
Video Documentation
Planning and managing digital-video projects to document concepts and procedures in technology, science, business, and education. Attention to scripting, shooting, editing, and distribution media. Students will work on individual activities and collaborate on a community-service or other client-centered project.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 438
Technical Exhibit Desisgn
Planning and managing informative and instructional exhibits in technical, scientific, and business contexts. Attention to characteristics and constraints of space, multimedia, and other resources, along with principles and goals of viewer access and flow. Students will work on individual activities and collaborate on a community-service or other client-centered project. Instruction will incorporate Chicago-area resources such as the Museum of Science and Industry.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

COM 440
Introduction to Journalism
Introduction to the principles and practices of modern American journalism. Students will analyze news stories and media, and will cover and report on campus area events. Student-generated news stories will be discussed, analyzed and evaluated.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

COM 485
Undergraduate Internship in Technical Communication
A cooperative arrangement between IIT and industry, the internship provides students with hands-on experience in the field of technical communication.
Credit: Variable

COM 491
Independent Reading and Research
Consent of department. For advanced students. Based on the selected topic, this course may or may not be applied to the humanities general education requirement. Consult the course instructor.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106
Credit: Variable
Satisfies: Humanities (H)

COM 497
Special Project
Special project. Based on the selected topic, this course may or may not be applied to the humanities general education requirement. Consult the course instructor.
Credit: Variable
Satisfies: Communications (C), Humanities (H)

Computer Science (CS)

CS 100
Introduction to the Profession
An introduction to science and engineering as a profession. Examines the problem-solving process used in engineering and science. Emphasizes the interdisciplinary and international nature of problem-solving and the need to evaluate solutions in terms of a variety of constraints: computational, financial, and social.
Lecture: 1 **Lab:** 2 **Credits:** 2
Satisfies: Communications (C)

CS 104
Introduction to Computer Programming for Engineers
Introduces the use of high-level programming language as a problem-solving tool in engineering including basic data structures and algorithms, structured programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming. Students should only take one of these courses (CS 104, CS 105, CS 115).
Lecture: 2 **Lab:** 1 **Credits:** 2

CS 105
Introduction to Computer Programming
Introduces the use of high-level programming language as a problem-solving tool, including basic data structures and algorithms, structured programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming. Students should only take one of these courses (CS 104, CS 105, CS 115).
Lecture: 2 **Lab:** 1 **Credits:** 2

CS 110
Computing Principles
An introduction to the following "big ideas" of computer science: (1) computing is a creative activity; (2) abstraction reduces information and detail to facilitate focus on relevant concepts; (3) data and information facilitate the creation of knowledge; (4) algorithms are used to develop and express solutions to computational problems; (5) programming enables problem solving, human expression, and creation of knowledge; (6) the internet pervades modern computing; and (7) computing has global impacts.
Lecture: 2 **Lab:** 1 **Credits:** 2

CS 115
Object-Oriented Programming I
Introduces the use of a high-level object-oriented programming language as a problem-solving tool, including basic data structures and algorithms, object-oriented programming techniques, and software documentation. Designed for students who have had little or no prior experience with computer programming. For students in CS and CS-related degree programs. Students should only take one of these courses (CS 104, CS 105, CS 115).
Lecture: 2 **Lab:** 1 **Credits:** 2

CS 116
Object-Oriented Programming II
Introduces more advanced elements of object-oriented programming, including dynamic data structures, recursion, searching and sorting, and advanced object-oriented programming techniques. For students in CS and CS-related degree programs.
Prerequisite(s): CS 115 with min. grade of C
Lecture: 2 **Lab:** 1 **Credits:** 2
Satisfies: Communications (C)

CS 201
Accelerated Introduction to Computer Science
Problem-solving and design using an object-oriented programming language. Introduces a variety of problem-solving techniques, algorithms, and data structures in object-oriented programming.
Prerequisite(s): CS 104 with min. grade of C or CS 105 with min. grade of C or CS 110 with min. grade of C or CS 115 with min. grade of C
Lecture: 3 **Lab:** 2 **Credits:** 4
Satisfies: Communications (C)

CS 330
Discrete Structures
Introduction to the use of formal mathematical structures to represent problems and computational processes. Topics covered include Boolean algebra, first-order logic, recursive structures, graphs, and abstract language models. Credit will not be granted for both CS 330 and MATH 230.
Prerequisite(s): CS 201 or CS 116
Lecture: 3 **Lab:** 1 **Credits:** 3
Satisfies: Communications (C)

CS 331
Data Structures and Algorithms
Implementation and application of the essential data structures used in computer science. Analysis of basic sorting and searching algorithms and their relationship to these data structures. Particular emphasis is given to the use of object-oriented design and data abstraction in the creation and application of data structures.
Prerequisite(s): CS 116 or CS 201
Lecture: 3 **Lab:** 1 **Credits:** 3

CS 340
Programming Paradigms and Patterns
This class balances the imperative, object-oriented bent of the introductory programming sequence by presenting alternative programming paradigms and asks students to write complex programs from scratch while amassing a repertoire of reusable programming patterns and techniques. Programming assignments, drawn from various domains of computer science, will highlight the importance of selecting appropriate data structures, algorithms, and techniques for the problem at hand.
Prerequisite(s): CS 116 or CS 201
Lecture: 3 **Lab:** 0 **Credits:** 3

CS 350
Computer Organization and Assembly Language Programming
Introduction to the internal architecture of computer systems, including micro-, mini-, and mainframe computer architectures. Focuses on the relationship among a computer's hardware, its native instruction set, and the implementation of high-level languages on that machine. Uses a set of assembly language programming exercises to explore and analyze a microcomputer architecture. Credit will not be granted for both CS 350 and ECE 242.
Prerequisite(s): CS 116* or CS 201*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 1 **Credits:** 3

CS 351
Systems Programming
Examines the components of sophisticated multilayer software systems, including device drivers, systems software, applications interfaces, and user interfaces. Explores the design and development of interrupt-driven and event-driven software.
Prerequisite(s): (CS 331 and CS 350) or (CS 331 and ECE 242)
Lecture: 3 **Lab:** 1 **Credits:** 3

CS 397
Special Projects
Instructor permission required.
Credit: Variable

CS 401
Introduction to Advanced Studies I
First course in a two-course sequence that is designed to prepare students for graduate study in computer science. Explores the implementation and application of fundamental data structures and algorithms with an emphasis on object-oriented programming in Java. Examines the relationship between these elements and the mathematical structures that form the foundation of computer science. This course does not apply toward M. S./Ph. D. credit in Computer Science.
Prerequisite(s): CS 200 or CS 201
Lecture: 2 **Lab:** 2 **Credits:** 3

CS 402
Introduction to Advanced Studies II
Second course in a two-course sequence that is designed to prepare students for graduate study in computer science. Explores the development of the multiple layers of software that form a sophisticated software system, from device drivers to application interfaces to user interfaces. Examines how computer architecture influences software development. Emphasizes the design and implementation of interrupt-driven/event-driven software.
Prerequisite(s): CS 401
Lecture: 2 **Lab:** 2 **Credits:** 3

CS 403
Foundations to Advanced Studies
This course is a six-credit hour integration of CS 401 and CS 402. The course is an introduction to data structures but is designed to expand programming skills/concepts using software development methodology techniques. The course also provides an introduction to computer architecture and systems programming including assembly language programming, event handling and multi-threading.
Lecture: 4 **Lab:** 4 **Credits:** 6

CS 406
Introduction to Discrete Structures and Algorithms
This course will provide students with an understanding of some basic discrete mathematics and techniques for designing computer algorithms and measuring and analyzing their behavior. We emphasize the necessary mathematical ideas such as how to prove a mathematical statement, how to analyze the worst case and the average case complexity of an algorithm. We also introduce students to some new techniques used in designing algorithms, such as the approximation algorithms and randomized algorithms.
Lecture: 3 **Lab:** 0 **Credits:** 3

CS 411
Computer Graphics
Overview of display devices and applications. Vector graphics in two and three dimensions. Image generation, representation, and manipulation. Homogeneous coordinates. Modeling and hidden line elimination. Introduction to raster graphics. Perspective and parallel projections.
Prerequisite(s): CS 331 or CS 401 or CS 403
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 422
Data Mining
This course will provide an introductory look at concepts and techniques in the field of data mining. After covering the introduction and terminologies to Data Mining, the techniques used to explore the large quantities of data for the discovery of meaningful rules and knowledge such as market basket analysis, nearest neighbor, decision trees, and clustering are covered. The students learn the material by implementing different techniques throughout the semester.
Prerequisite(s): CS 331 or CS 401 or CS 403
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 425
Database Organization
Overview of database architectures, including the Relational, Hierarchical, Network, and Object Models. Database interfaces, including the SQL query language. Database design using the Entity-Relationship Model. Issues such as security, integrity, and query optimization.
Prerequisite(s): CS 331 or CS 401 or CS 403
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 429
Information Retrieval
Overview of fundamental issues of information retrieval with theoretical foundations. The information-retrieval techniques and theory, covering both effectiveness and run-time performance of information-retrieval systems are covered. The focus is on algorithms and heuristics used to find documents relevant to the user request and to find them fast. The course covers the architecture and components of the search engine such as parser, stemmer, index builder, and query processor. The students learn the material by building a prototype of such a search engine. Requires strong programming knowledge.
Prerequisite(s): CS 331 or CS 401
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 430
Introduction to Algorithms
Introduction to the design, behavior, and analysis of computer algorithms. Searching, sorting, and combinatorial algorithms are emphasized. Worst case, amortized, and expected bounds on time and space usage.
Prerequisite(s): (CS 331 and CS 330) or (CS 331 and MATH 230) or CS 401 or CS 403
Lecture: 3 **Lab:** 1 **Credits:** 3
Satisfies: Communications (C), CS Technical Elective (T)

CS 440
Programming Languages and Translators
Study of commonly used computer programming languages with an emphasis on precision of definition and facility in use. Scanning, parsing, and introduction to compiler design. Use of compiler generating tools.
Prerequisite(s): (CS 330 and CS 331) or (MATH 230 and CS 331) or CS 401 or CS 403
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 442
Mobile Applications Development
Students will learn a variety of software engineering techniques and design patterns to assist in the rapid development and prototyping of applications, leveraging frameworks and APIs provided by current mobile development platforms (such as Android and iOS). Application lifecycles, data management and persistence mechanisms, and user interface design, among other topics, will be covered. Industry speakers will be invited to speak about best practices. Students (individually or in teams) will take ideas from concept to final implementation and will present their work at the end of the semester. When appropriate, students may take the additional step of deploying their work on the appropriate application marketplace(s).
Prerequisite(s): (CS 331 or CS 401) and (CS 351* or CS 402*), An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 443
Compiler Construction
This course covers the design and implementation of a compiler for modern languages by implementing the following: abstract syntax trees; intermediate representations; static analysis; fix-point operations; symbol tables and type checking; and first-order and high-order function implementation. Students will incrementally create a series of compilers.
Prerequisite(s): CS 440
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 445
Object Oriented Design and Programming
Introduction to methodologies for object-oriented design and programming. Examines the object model and how it is realized in various object-oriented languages. Focuses on methods for developing and implementing object-oriented systems.
Prerequisite(s): CS 331 or CS 401 or CS 403
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 447
Distributed Objects
This course provides an introduction to architecture, analysis, design, and implementation of distributed, multi-tier applications using distributed object technology. The course focuses on the services and facilities provided by an Object Request Broker (ORB). Students will use a commercially available ORB and Database Management System to develop distributed object applications.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 450
Operating Systems
Introduction to operating system concepts-including system organization for uniprocessors and multiprocessors, scheduling algorithms, process management, deadlocks, paging and segmentation, files and protection, and process coordination and communication.
Prerequisite(s): CS 351 or (CS 401 and CS 402) or CS 403
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 451
Introduction to Parallel and Distributed Computing
This course covers general introductory concepts in the design and implementation of parallel and distributed systems covering all the major branches such as cloud computing, grid computing, cluster computing, supercomputing, and many-core computing.
Prerequisite(s): CS 351 or CS 450
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 455
Data Communications
Introduction to data communication concepts and facilities with an emphasis on protocols and interface specifications. Focuses on the lower four layers of the ISO-OSI reference model.
Prerequisite(s): CS 450
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 456
Introduction to Wireless Networks and Performance
This class provides an opportunity for students to obtain a fundamental understanding of the nature and operation of the full range of wireless networks (personal, local area, wide area, and satellite) and their performance characteristics, future potential, and challenges through class lectures, assigned readings, homework, projects, and various hands-on experiences.
Prerequisite(s): CS 350 or ECE 242 or (CS 401 and CS 402) or CS 403
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 458
Introduction to Information Security
An introduction to the fundamentals of computer and information security. This course focuses on algorithms and techniques used to defend against malicious software. Topics include an introduction to encryption systems, operating system security, database security, network security, system threats, and risk avoidance procedures.
Prerequisite(s): CS 425 or CS 450 or CS 455
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 470
Computer Architecture
Introduction to the functional elements and structures of digital computers. Detailed study of specific machines at the register transfer level illustrates arithmetic, memory, I/O and instruction processing.
Prerequisite(s): CS 350 or ECE 242
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 480
Introduction to Artificial Intelligence
Introduction to computational methods for intelligent control of autonomous agents, and the use of programming paradigms that support development of flexible and reactive systems. These include heuristic search, knowledge representation, constraint satisfaction, probabilistic reasoning, decision-theoretic control, and sensor interpretation. Particular focus will be places on real-world application of the material.
Prerequisite(s): (CS 331 and MATH 474*) or (CS 401 and CS 402) or (CS 331 and MATH 475*), An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 481
Artificial Intelligence Language Understanding
Theory and programming paradigms that enable systems to understand human language texts and extract useful information and knowledge. For example, extraction of structured event representations from news stories or discovering new research hypotheses by analyzing thousands of medical research articles. the course covers a variety of text analysis and text mining methods, with an emphasis on building working systems. Connections to information retrieval, data mining, and speech recognition will be discussed.
Prerequisite(s): (CS 331 or CS 401 or CS 403) and MATH 474
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 482
Information and Knowledge Management Systems
This capstone course is designed as a project course whose purpose is to enable students to see how the various algorithms and systems they have learned about in their prerequisite courses can be used in context to create useful knowledge management tools. Class periods will be divided among discussion of design of information and knowledge management systems, lectures on effective project management techniques, and hands-on advising of student project group meetings.
Prerequisite(s): (CS 425 and CS 422 and CS 429) or (CS 425 and CS 422 and CS 481) or (CS 425 and CS 429 and CS 481)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 484
Introduction to Machine Learning
An introduction to machine learning concepts and algorithms, including classification, clustering, and regression. Topics include k-means clustering, nearest neighbors classification, decision trees, naive Bayes, logistic regression, support vector machines, and neural networks. Special focus will be on practical aspects of machine learning, including data preparation, experimental design, and modern tools for building machine learning systems. Basic probability theory knowledge is required.
Prerequisite(s): MATH 151 and CS 116 or CS 201 or CS 401 and CS 402
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CS Technical Elective (T)

CS 485
Computers and Society
Discussion of the impact of computer technology on present and future society. Historical development of the computer. Social issues raised by cybernetics.
Prerequisite(s): COM 421 or COM 424 or COM 425 or COM 428 or COM 435
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

CS 487
Software Engineering I
Study of the principles and practices of software engineering. Topics include software quality concepts, process models, software requirements analysis, design methodologies, software testing and software maintenance. Hands-on experience building a software system using the waterfall life cycle model. Students work in teams to develop all life cycle deliverables: requirements document, specification and design documents, system code, test plan, and user manuals.
Prerequisite(s): (CS 331 or CS 401 or CS 403) and CS 425
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), CS Technical Elective (T)

CS 491
Undergraduate Research
Instructor permission required.
Credit: Variable

CS 492
Introduction to Computer Science Research
Prepares undergraduate computer science majors for conducting research.
Lecture: 1 **Lab:** 0 **Credits:** 1

CS 495
Topics in Computer Science
This course will treat a specific topic, varying from semester to semester, in which there is particular student or staff interest.
Credit: Variable

CS 497
Special Projects
Special projects.
Credit: Variable

Economics (ECON)

ECON 151
Microeconomics
This course develops and applies economic models to understand the behavior of firms and consumers in the marketplace. The course explores microeconomic concepts such as demand and supply, market structures and pricing, market efficiency, public goods, externalities, and equilibrium. Combining knowledge from microeconomics and game theory, students will study interactions among firms and consumers given a wide range of market conditions, regulatory regimes, and competitive landscapes.
Lecture: 3 **Lab:** 0 **Credits:** 3

ECON 152
Global Economics
This course exposes students to the economic framework for understanding global macroeconomic events, foreseeing the evolution of macro variables, and applying this knowledge to professional decision-making. Students will use international case studies along with data about global indicators from the international business and economics media to provide different perspectives on monetary, fiscal, and public policy issues in the global marketplace. In addition, the course will explore macroeconomic concepts including inflation, unemployment, trade, GDP, and economic growth and development.
Prerequisite(s): ECON 151 or ECON 211
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Ethics (E)

ECON 211
Principles of Economics
The determination of output, employment and the rate of inflation. Topics include a broad-based discussion of the controversies in macro-economics, the appropriate use of fiscal and monetary policy, the effects of a budget deficit, determination of the rate of exchange, and the trade deficit. Offered in fall and spring.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

ECON 391
Upper-Level Social Science
Lecture: 0 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

ECON 392
Upper-Level Social Science
Lecture: 0 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

ECON 423
Economic Analysis of Capital Investments
This course explores the valuation of proposed capital investments in both the public and private sectors. Students will learn how to determine the relevant cash flows associated with a proposed capital investment. Then, they will subject these cash flows to analysis by three major decision models that incorporate time value of the following money concepts: Net Present Value; Equivalent Uniform Benefit/Cost; and Internal Rate of Return. Students will also learn how to incorporate income taxes, inflation, risk, and capital rationing in the analysis of a project.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

Electrical and Computer Engr (ECE)

ECE 100
Introduction to the Profession I
Introduces the student to the scope of the engineering profession and its role in society and develops a sense of professionalism in the student. Provides an overview of electrical engineering through a series of hands-on projects and computer exercises. Develops professional communication and teamwork skills.
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

ECE 211
Circuit Analysis I
Ohm's Law, Kirchhoff's Laws, and network element voltage-current relations. Application of mesh and nodal analysis to circuits. Dependent sources, operational amplifier circuits, superposition, Thevenin's and Norton's Theorems, maximum power transfer theorem. Transient circuit analysis for RC, RL, and RLC circuits. Introduction to Laplace Transforms. Laboratory experiments include analog and digital circuits; familiarization with test and measurement equipment; combinational digital circuits; familiarization with latches, flip-flops, and shift registers; operational amplifiers; transient effects in first-order and second-order analog circuits; PSpice software applications. Concurrent registration in MATH 252 and ECE 218.
Prerequisite(s): MATH 252*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 213
Circuit Analysis II
Sinusoidal excitation and phasors. AC steady-state circuit analysis using phasors. Complex frequency, network functions, pole-zero analysis, frequency response, and resonance. Two-port networks, transformers, mutual inductance, AC steady-state power, RMS values, introduction to three-phase systems and Fourier series. Design-oriented experiments include counters, finite state machines, sequential logic design, impedances in AC steady-state, resonant circuits, two-port networks, and filters. A final project incorporating concepts from analog and digital circuit design will be required. Prerequisites: ECE 211 with a grade C or better.
Prerequisite(s): ECE 211 with min. grade of C
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

ECE 216
Circuit Analysis II
Sinusoidal excitation and phasors. AC steady-state circuit analysis using phasors. Complex frequency, network functions, pole-zero analysis, frequency response, and resonance. Two-port networks, transformers, mutual inductance, AC steady-state power, RMS values, introduction to three-phase systems and Fourier series. Note: ECE 216 is for non-ECE majors.
Prerequisite(s): ECE 211 with min. grade of C
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 218
Digital Systems
Number systems and conversions, binary codes, and Boolean algebra. Switching devices, discrete and integrated digital circuits, analysis and design of combinational logic circuits. Karnaugh maps and minimization techniques. Counters and registers. Analysis and design of synchronous sequential circuits.
Lecture: 3 **Lab:** 1 **Credits:** 4

ECE 242
Digital Computers and Computing
Basic concepts in computer architecture, organization, and programming, including: integer and floating point number representations, memory organization, computer processor operation (the fetch/execute cycle), and computer instruction sets. Programming in machine language and assembly language with an emphasis on practical problems. Brief survey of different computer architectures.
Prerequisite(s): (CS 116 and ECE 218) or CS 201
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 307
Electrodynamics
Analysis of circuits using distributed network elements. Response of transmission lines to transient signals. AC steady-state analysis of lossless and lossy lines. The Smith Chart as an analysis and design tool. Impedance matching methods. Vector analysis applied to static and time-varying electric and magnetic fields. Coulomb's Law, electric field intensity, flux density and Gauss's Law. Energy and potential. Biot-Savart and Ampere's Law. Maxwell's equations with applications including uniform-plane wave propagation.
Prerequisite(s): ECE 213 and PHYS 221 and MATH 251
Lecture: 3 **Lab:** 3 **Credits:** 4

ECE 308
Signals and Systems
Time and frequency domain representation of continuous and discrete time signals. Introduction to sampling and sampling theorem. Time and frequency domain analysis of continuous and discrete linear systems. Fourier series convolution, transfer functions. Fourier transforms, Laplace transforms, and Z-transforms.
Prerequisite(s): MATH 252 and MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 311
Engineering Electronics
Physics of semiconductor devices. Diode operation and circuit applications. Regulated power supplies. Bipolar and field-effect transistor operating principles. Biasing techniques and stabilization. Linear equivalent circuit analysis of bipolar and field-effect transistor amplifiers. Laboratory experiments reinforce concepts.
Prerequisite(s): ECE 213
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

ECE 312
Electronic Circuits
Analysis and design of amplifier circuits. Frequency response of transistor amplifiers. Feedback amplifiers. Operational amplifiers: internal structure, characteristics, and applications. Stability and compensation. Laboratory experiments reinforce concepts.
Prerequisite(s): ECE 311
Lecture: 3 **Lab:** 3 **Credits:** 4

ECE 319
Fundamentals of Power Engineering
Principles of electromechanical energy conversion. Fundamentals of the operations of transformers, synchronous machines, induction machines, and fractional horsepower machines. Introduction to power network models and per-unit calculations. Gauss-Seidel load flow. Lossless economic dispatch. Symmetrical three-phase faults. Laboratory considers operation, analysis, and performance of motors and generators. The laboratory experiments also involve use of PC-based interactive graphical software for load flow, economic dispatch, and fault analysis.
Prerequisite(s): ECE 213
Lecture: 3 **Lab:** 3 **Credits:** 4

ECE 401
Communication Electronics
Radio frequency AM, FM, and PM transmitter and receiver principles. Design of mixers, oscillators, impedance matching networks, filters, phase-locked loops, tuned amplifiers, power amplifiers, and crystal circuits. Nonlinear effects, intermodulation distortion, and noise. Transmitter and receiver design specification.
Prerequisite(s): ECE 307 and ECE 312 and ECE 403*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 403
Digital and Data Communication Systems
Introduction to Amplitude, Phase, and Frequency modulation systems. Multiplexing and Multi-Access Schemes; Spectral design considerations. Sampling theorem. Channel capacity, entropy; Quantization, wave shaping, and Inter-Symbol Interference (ISI), Matched filters, Digital source encoding, Pulse Modulation systems. Design for spectral efficiency and interference control. Probability of error analysis, Analysis and design of digital modulators and detectors.
Prerequisite(s): ECE 308
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 405
Digital and Data Communication Systems with Laboratory
Introduction to Amplitude, Phase, and Frequency modulation systems. Multiplexing and Multi-Access Schemes; Spectral design considerations. Sampling theorem. Channel capacity, entropy; Quantization, wave shaping, and Inter-Symbol Interference (ISI), Matched filters, Digital source encoding, Pulse Modulation systems. Design for spectral efficiency and interference control. Probability of error analysis, Analysis and design of digital modulators and detectors.
Prerequisite(s): ECE 308
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 406
Introduction to Wireless Communication Systems
The course addresses the fundamentals of wireless communications and provides an overview of existing and emerging wireless communications networks. It covers radio propagation and fading models, fundamentals of cellular communications, multiple access technologies, and various wireless networks including past and future generation networks. Simulation of wireless systems under different channel environments will be an integral part of this course.
Prerequisite(s): ECE 403
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 407
Introduction to Computer Networks with Laboratory
Emphasis on the physical, data link, and medium access layers of the OSI architecture. Different general techniques for networking tasks, such as error control, flow control, multiplexing, switching, routing, signaling, congestion control, traffic control, scheduling will be covered along with their experimentation and implementation in a laboratory. Credit given for ECE 407 or ECE 408, not both.
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 408
Introduction to Computer Networks
Emphasis on the physical, data link and medium access layers of the OSI architecture. Different general techniques for networking tasks, such as error control, flow control, multiplexing, switching, routing, signaling, congestion control, traffic control, scheduling will be covered. Credit given for ECE 407 or ECE 408, not both.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 411
Power Electronics
Power electronic circuits and switching devices such as power transistors, MOSFET's, SCR's, GTO's, IGBT's and UJT's are studied. Their applications in AC/DC DC/DC, DC/AC and AC/AC converters as well as switching power supplies are explained. Simulation mini-projects and lab experiments emphasize power electronic circuit analysis, design and control.
Prerequisite(s): ECE 311
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 412
Hybrid Electric Vehicle Drives
Fundamentals of electric motor drives are studied. Applications of semiconductor switching circuits to adjustable speed drives, robotic, and traction are explored. Selection of motor drives, calculating the ratings, speed control, position control, starting, and braking are also covered. Simulation mini-projects and lab experiments are based on the lectures given.
Prerequisite(s): ECE 311 and ECE 319
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 417
Power Distribution Engineering
This is an introduction into power distribution systems from the utility engineering perspective. The course looks at electrical service from the distribution substation to the supply line feeding a customer. The course studies the nature of electrical loads, voltage characteristics and distribution equipment requirements. The fundamentals of distribution protection are reviewed including fast/relay coordination. Finally, power quality and reliability issues are addressed.
Prerequisite(s): ECE 319
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 418
Power System Analysis
Transmission systems analysis and design. Large scale network analysis using Newton-Raphson load flow. Unsymmetrical short-circuit studies. Detailed consideration of the swing equation and the equal-area criterion for power system stability studies. Credit will be given for ECE 418 or ECE 419, but not for both.
Prerequisite(s): ECE 319
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 419
Power Systems Analysis with Laboratory
Transmission systems analysis and design. Large scale network analysis using Newton-Raphson load flow. Unsymmetrical short-circuit studies. Detailed consideration of the swing equation and the equal-area criterion for power system stability studies. Use of commercial power system analysis tool to enhance understanding in the laboratory.
Prerequisite(s): ECE 319
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 420
Analytical Methods for Power System Economics and Cybersecurity
Analytical Methods for the Economic operation of power systems with consideration of transmission losses. Analytical methods for the optimal scheduling of power generation, including real power and reactive power. Analytical methods for the estimation of power system state. Analytical methods for the modeling of smart grid cybersecurity.
Prerequisite(s): ECE 319
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 421
Microwave Circuits and Systems
Maxwell's equations, waves in free space, metallic and dielectric waveguides, microstrips, microwave cavity resonators and components, ultra-high frequency generation and amplification. Analysis and design of microwave circuits and systems. Credit will be given for either ECE 421 or ECE 423, but not for both.
Prerequisite(s): ECE 307
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 423
Microwave Circuits and Systems with Laboratory
Maxwell's equations, waves in free space, metallic and dielectric waveguides, microstrips, microwave cavity resonators and components, ultra-high frequency generation and amplification. Analysis and design of microwave circuits and systems. Credit will be given for either ECE 421 or ECE 423, but not for both.
Prerequisite(s): ECE 307
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 425
Analysis and Design of Integrated Circuits
Contemporary analog and digital integrated circuit analysis and design techniques. Bipolar, CMOS and BICMOS IC fabrication technologies, IC Devices and Modeling, Analog ICs including multiple-transistor amplifiers, biasing circuits, active loads, reference circuits, output buffers; their frequency response, stability and feedback consideration. Digital ICs covering inverters, combinational logic gates, high-performance logic gates, sequential logics, memory and array structures.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 429
Introduction to VLSI Design
Processing, fabrication, and design of Very Large Scale Integration (VLSI) circuits. MOS transistor theory, VLSI processing, circuit layout, layout design rules, layout analysis, and performance estimation. The use of computer aided design (CAD) tools for layout design, system design in VLSI, and application-specific integrated circuits (ASICs). In the laboratory, students create, analyze, and simulate a number of circuit layouts as design projects, culminating in a term design project.
Prerequisite(s): ECE 218 and ECE 311
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 430
Fundamentals of Semiconductor Devices
The goals of this course are to give the student an understanding of the physical and operational principles behind important electronic devices such as transistors and solar cells. Semiconductor electron and hole concentrations, carrier transport, and carrier generation and recombination are discussed. P-N junction operation and its application to diodes, solar cells, and LEDs are developed. The field-effect transistor (FET) and bipolar junction transistor (BJT) are then discussed and their terminal operation developed. Application of transistors to bipolar and CMOS analog and digital circuits is introduced.
Prerequisite(s): ECE 311
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 436
Digital Signal Processing I with Laboratory
Discrete-time system analysis, discrete convolution and correlation, Z-transforms. Realization and frequency response of discrete-time systems, properties of analog filters, IIR filter design, FIR filter design. Discrete Fourier Transforms. Applications of digital signal processing. Credit will be given for either ECE 436 or ECE 437, but not for both.
Prerequisite(s): ECE 308 or BME 330
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 437
Digital Signal Processing I
Discrete-time system analysis, discrete convolution and correlation, Z-transforms. Realization and frequency response of discrete-time systems, properties of analog filters, IIR filter design, FIR filter design. Discrete Fourier Transforms. Applications of digital signal processing. Credit will be given for either ECE 436 or ECE 437, but not for both.
Prerequisite(s): ECE 308 or BME 330
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 438
Control Systems
Signal-flow graphs and block diagrams. Types of feedback control. Steady-state tracking error. Stability and Routh Hurwitz criterion. Transient response and time domain design via root locus methods. Frequency domain analysis and design using Bode and Nyquist methods. Introduction to state variable descriptions.
Prerequisite(s): ECE 308 or BME 330
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 441
Microcomputers and Embedded Computing Systems
Microprocessors and microcontrollers. Standard and special interfaces. Hardware design and software development tools. Memories. Interrupt systems. Microcomputer system design and troubleshooting. Design with embedded computing systems. Emphasis on examples and applications.
Prerequisite(s): (ECE 218 or CS 470) and (ECE 242 or CS 350)
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 442
Internet of Things and Cyber Physical Systems
To introduce students to the fundamentals of Internet of Things (IoT) and embedded computing. This course covers IoT applications, Wireless protocols, Wearable sensors, Home environment sensors, Behavior detection sensors, Data fusion, processing and analysis, Data communications, Architectural design issues of IoT layers, Security and privacy issues in IoT.
Prerequisite(s): ECE 242
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 443
Introduction to Computer Cyber Security
Computer security as threats and defense mechanisms. Introductory cryptography and key management. Authentication and authorization. System security. Network security. Cloud and web security. Hardware security. Digital Forensics. Advanced cryptography topics.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 444
Computer Network Security
This course introduces network security by covering topics such as network-related security threats and solutions, private- and public-key encryptions, authentication, digital signatures, Internet Protocol security architecture (IPSEC), firewalls, network management, email, and web security.
Prerequisite(s): ECE 407 or ECE 408
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 446
Advanced Logic Design
Design and implementation of complex digital systems under practical design constraints. Timing and electrical considerations in combinational and sequential logic design. Digital system design using Algorithmic State Machine (ASM) diagrams. Design with modern logic families and programmable logic. Design-oriented laboratory stressing the use of programmable logic devices.
Prerequisite(s): ECE 218 and ECE 311
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: ECE Professional Elective (P)

ECE 447
Artificial Intelligence and Edge Computing
This course introduces methods in designing contemporary smart systems utilizing artificial intelligence, machine vision, and their applications. Topics include linear regression, logistic regression, multilayer neural networks, supervised/unsupervised learning, convolutional networks, and recurrent neural networks. This course also covers topics in deep learning algorithms and artificial intelligence structures optimized for low power embedded computing platforms (Edge Artificial Intelligence) with applications in machine vision, robotics, internet of things, smart grids and autonomous systems.
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 448
Application Software Design
The course provides introduction to languages and environments for application software development utilizing Software as a Service (SaaS) for electrical and computer engineers. Languages addressed include Java, Python, SQL, and JavaScript. Key topics covered include systems development life cycle, client-server architectures, database integration, RESTful service, and data visualization. Programming projects will include the development of a data-rich web application with server back-end that connects mobile devices and Internet of Things using Agile software engineering practices.
Prerequisite(s): ECE 242
Lecture: 3 **Lab:** 0 **Credits:** 3

ECE 449
Object-Oriented Programming and Machine Learning
This course gives students a clear understanding of the fundamental concepts of object-oriented design/programming (OOD/OOP). Languages addressed include C++ and Python. Key topics covered include introduction to machine and deep learning, software development life cycle, core language and standard library of C++ and Python, class design and design patterns, OpenMP and CUDA platforms. Students will design a complex learning application using these concepts and Agile software engineering practices.
Prerequisite(s): ECE 242 with min. grade of C
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 481
Image Processing
Mathematical foundations of image processing, including two-dimensional discrete Fourier transforms, circulant and block-circulant matrices. Digital representation of images and basic color theory. Fundamentals and applications of image enhancement, restoration, reconstruction, compression, and recognition.
Prerequisite(s): ECE 308 and MATH 374*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 485
Computer Organization and Design
This course provides the students with understanding of the fundamental concepts of computer architecture, organization, and design. It focuses on relationship between hardware and software and its influence on the instruction set and the underlying Central Processing Unit (CPU). The structural design of the CPU in terms of datapath and control unit is introduced. The technique of pipelining and hazard management are studied. Advanced topics include instruction level parallelism, memory hierarchy and cache operations, virtual memory, parallel processing, multiprocessors and hardware security. The end to end design of a typical computer system in terms of the major entities including CPU, cache, memory, disk, I/O, and bus with respect to cost/performance trade-offs is also covered. Differentiation between ECE 485 and ECE 585 is provided via use of projects / case studies at differing levels. (3-0-3) Undergraduate students can only be admitted to ECE 485 Graduate students can only be admitted to ECE 585.
Prerequisite(s): ECE 218 and ECE 242
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: ECE Professional Elective (P)

ECE 491
Undergraduate Research
Independent work on a research project supervised by a faculty member of the department. Prerequisite: Consents of academic advisor and instructor.
Credit: Variable
Satisfies: ECE Professional Elective (P)

ECE 494
Undergraduate Projects
Students undertake a project under the guidance of an ECE department faculty member. (1-4 variable) Prerequisite: Approval of the ECE instructor and academic advisor.
Credit: Variable
Satisfies: ECE Professional Elective (P)

ECE 497
Special Problems
Design, development, analysis of advanced systems, circuits, or problems as defined by a faculty member of the department. Prerequisite: Consents of academic advisor and instructor.
Credit: Variable
Satisfies: ECE Professional Elective (P)

Engineering Graphics (EG)

EG 225
Engineering Graphics for Non-Engineers
Designed for students in business, liberal arts and non-technical programs. Basic drafting techniques and applications, lettering, geometric constructions, charts and graphs, technical sketching, multiview projection, pictorial drawings, dimensioning, blueprint reading and working drawings. Introduction to computer graphics. Credit for this course is not applicable to an engineering degree.
Lecture: 2 **Lab:** 1 **Credits:** 3

EG 305
Advanced Engineering Graphics and Design
Advanced study of auxiliary views and sectioning, gears and cams, threads and fasteners, working drawings, assembly drawings, electronic drafting, ANSI drafting standards, and computer-aided drawing and design. Engineering design project.
Prerequisite(s): CAE 101 or MMAE 232
Lecture: 2 **Lab:** 1 **Credits:** 3

EG 306
Engineering Descriptive Geometry
Graphic solutions of problems involving point, line, and plane relationships by auxiliary views and revolutions. Developments and intersections of surfaces. Parallelism and perpendicularity, vectors, mining and civil engineering applications. Shades and shadows, conics, map projection and spherical triangles. Emphasis on applications which promote visualization and introduce new engineering experiences. Applications of computers to problem solving.
Prerequisite(s): CAE 101 or MMAE 232
Lecture: 2 **Lab:** 2 **Credits:** 3

EG 325
Advanced Engineering Graphics for Non-Engineers
Threads and fasteners, sectioning and auxiliary views, limit dimensioning, detail and assembly drawings, data representation, principles of descriptive geometry, manufacturing processes and computer graphics/CAD. Credit for this course is not applicable to an engineering degree.
Prerequisite(s): EG 225
Lecture: 2 **Lab:** 1 **Credits:** 3

EG 329
Graphic Representation for Non-Engineers
Basic techniques of graphics applied to communications and report writing. Use of computer graphics to generate charts and graphs including line charts, two- and three-dimensional bar charts, and pie charts. Integration of graphical presentations into technical and business reports. Credit for this course is not applicable to an engineering degree.
Prerequisite(s): EG 225
Lecture: 3 **Lab:** 0 **Credits:** 3

EG 405
Mechanical Design Graphics
Basic concepts of mechanical design and analysis. Advanced design layouts, details, assemblies, tolerance systems, surface finish control, materials, processes, ANSI drafting standards, engineering design processes, systems and procedures, application of computers to design, and CAD/CAM. Requires junior standing.
Prerequisite(s): EG 305
Lecture: 2 **Lab:** 2 **Credits:** 3

EG 406
Technical and Pictorial Illustration
Theory and construction of parallel and perspective pictorial projections, axonometric and oblique projections, parallel and angular perspective. Exploded pictorial assemblies. Basic rendering techniques used in technical illustration. Introduction to computer-generated pictorials. Requires junior standing.
Prerequisite(s): CAE 101 or MMAE 232
Lecture: 2 **Lab:** 2 **Credits:** 3

EG 409
Computer-Generated Pictorial Projections
Study of computer-generated representations of three-dimensional objects. Projections include multiview, perspective, axonometric (isometric, dimetric, and trimetric), and oblique.
Prerequisite(s): EG 406
Lecture: 2 **Lab:** 2 **Credits:** 3

EG 419
Computer Graphics in Engineering
Techniques of PC-based (AutoCAD) computer-aided drawing and design. Study of computer graphic hardware and software systems through demonstrations and use. Both 2D and 3D representation of components and assemblies from various engineering disciplines. Requires junior standing.
Prerequisite(s): CAE 101 or MMAE 232
Lecture: 2 **Lab:** 2 **Credits:** 3

EG 425
Computer Graphics for Non-Engineers
Principles and applications of computer graphics in business and nontechnical fields. Study of computer graphics hardware and software systems. Use of computer in producing charts, graphs, and technical drawings. Use of PC-CAD in problem solving and design. Credit for this course is not applicable to an engineering degree. Requires junior standing.
Prerequisite(s): EG 325
Lecture: 2 **Lab:** 1 **Credits:** 3

EG 429
Computer Graphics for Desktop Publishing
Integration of computer graphic-generated images into technical and business reports produced with popular desktop publishing software. Emphasis on creation and selection of graphical presentations for optimum readability. Scanning and retouching techniques for two- and three-dimensional presentations. Introduction to multi-media and slide presentations. Credit for this course is not applicable to an engineering degree. Junior standing required.
Prerequisite(s): EG 329
Lecture: 2 **Lab:** 2 **Credits:** 3

EG 430
Introduction to Building Information Modeling
Fundamentals and practical use of information technologies in design; basic concepts of building information modeling (BIM); review of software and technology available for BIM; practical use of BIM in design for creating a site, viewing a model, starting a project, working in the AutoDesk "Revit" Environment, adding basic building elements to a project, conceptual energy analysis, designing a preliminary layout, and presenting a project.
Lecture: 3 **Lab:** 0 **Credits:** 3

EG 497
Special Problems
Special problems. Requires junior standing.
Credit: Variable

Engineering Management (EMGT)

EMGT 363
Creativity, Inventions, and Entrepreneurship for Engineers and Scientists
This course will introduce students to theories, processes, and best practices that invoke creativity, innovation, inventions, and entrepreneurship in engineers and scientists to create a patentable technology by the end of the semester. Skills will be developed in understanding and searching for patents, learning and applying brainstorming, team learning, exploring deep needs, market and industry analysis, finding "white space," and creating effective elevator pitches for your idea. Students will learn to support and pitch the need, uniqueness of their approach, cost versus benefits, competition, and alternatives so their ideas can take advantage of the exponential economy.
Lecture: 3 **Lab:** 0 **Credits:** 3

EMGT 406
Entrepreneurship and Intellectual Property Management
This course intends to introduce and develop a number of diversified professional skills necessary for success in an engineering research and development environment. Selected topics in the areas of technology entrepreneurship, opportunity assessment, creativity and innovation, project management, management of organizational change, and entrepreneurial leadership are discussed. Significant effort is placed on understanding and managing intellectual property.
Lecture: 3 **Lab:** 0 **Credits:** 3

EMGT 470
Project Management
Introduction and practice of project form of organization for accomplishing tasks in engineering firms. Develops the attributes required of a project manager. Introduction to project management form most appropriate for engineering tasks, evaluating projects for funding, establishing planning, budgeting, and initiation process, extensive analysis of scheduling techniques, resource allocation during scheduling, monitoring project progress, the project control cycle, avoiding scope creep, auditing projects and completion of the project. The case study method is used throughout the class to provide students experiential-learning opportunities. This class cannot be substituted for courses in the construction management major in CAEE.
Lecture: 3 **Lab:** 0 **Credits:** 3

Environmental Engineering (ENVE)

ENVE 401
Introduction to Water-Resources Engineering
The theory and practice involved in planning and design of urban water systems are introduced in this course. Topics include storm water management, water supply distribution, and waste water collection and transport systems.
Lecture: 3 **Lab:** 0 **Credits:** 3

ENVE 402
Introduction to Environmental Engineering and Sustainable Design
This course provides an overview of how environmental engineers integrate biological, chemical, and physical sciences with engineering design methods to develop solutions to environmental problems. Topics include air pollution, water pollution, solid waste management, fate and transport of contaminants, pollution prevention, environmental regulation, risk assessment, climate science, and sustainability assessment. Focuses on applications and actual design practice.
Prerequisite(s): CHEM 124 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: CAE Design Course (D)

ENVE 403
Introduction to Occupational and Environmental Health and Safety
This course is intended to introduce students to the basics of occupational and environmental safety and health. Topics include fundamental principles in industrial hygiene and occupational and environmental safety based in the anticipation, recognition, evaluation, and control of chemical, biological, physical, and ergonomic hazards that can be encountered in the workplace and other settings. Applications include indoor air pollution control, natural disaster mitigation, and infectious disease transmission and control. Understanding of basic chemistry and elementary statistics is recommended.
Lecture: 3 **Lab:** 0 **Credits:** 3

ENVE 404
Water and Wastewater Engineering
Water quality and water supply issues make up this course including the physical, chemical, and biological processes involved in water treatment. Process design, operations, and management are also considered.
Lecture: 3 **Lab:** 0 **Credits:** 3

ENVE 463
Introduction to Air Pollution Control
Air pollution sources and characteristics of source emissions, atmospheric reactions, effects of pollutants, and techniques of emission control are presented in this course. Legal and administrative aspects of air pollution control are also described.
Lecture: 3 **Lab:** 0 **Credits:** 3

ENVE 476
Engineering Control of Industrial Hazards
Design of control systems to enhance occupational safety and health; how to recognize and control existing or potential safety and health hazards.
Prerequisite(s): ENVE 426*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

ENVE 485
Industrial Ecology
This course provides an overview of industrial ecology, the study of the science and engineering relationships between cultural and ecological systems, and how those relationships can be managed to achieve a more sustainable economy. Because it is an interdisciplinary field, topics include technology (science and engineering), public policy and regulatory issues, and business administration.
Lecture: 3 **Lab:** 0 **Credits:** 3

ENVE 497
Special Project
Special design project under individual supervision of instructor. Consent of instructor is required.
Credit: Variable

Food Science and Nutrition (FDSN)

FDSN 100
Introduction to the Profession
In this course students will survey the professional landscape of the food industry. The course provides an introduction to the different career roles and opportunities within the food industry. The rich Chicago food industry will serve as a backdrop to learn about the current and emerging food ecosystem. Students will hear from industry guest speakers about the legacy and latest start-up enterprises that comprise various professional paths. Field trips to local food business incubators and food processing plants are planned. The course will also provide an introduction to food regulations.
Lecture: 2 **Lab:** 0 **Credits:** 2

FDSN 201
Nutrition and Wellness
Introduction to the basic principles of nutrition and the relationship of the human diet to health. Overview of the nutrition profession, the biological uses of nutrients, and tools for dietary planning and assessment in various settings. Examination of specific issues such as weight management, sports nutrition, food safety, the diet-disease relationship, and global nutrition. Analysis of special nutritional requirements and needs during the life cycle.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

FDSN 210
Introduction to Culinology
This course gives a broad overview of the new field of culinology: the blending of culinary arts and food science training. Topics include Principles of Cooking, Formula and Recipe Development, Culinary Fundamentals and Production Systems, Culinary Uses and Applications of Products, Flavor Building, and Functional Ingredients, and how these all integrate with Food Safety and Sanitation Principles.
Lecture: 2 **Lab:** 0 **Credits:** 2

FDSN 300
Nutrition Through the Life Cycle
This course analyzes the changing nutritional requirements and relative dietary and psycho-social issues which are specific to the different stages of the life cycle. Expected student outcomes include the following: (1) the student will be able to identify specific nutrient requirements for each stage of the life cycle; (2) the student will be able to relate nutrient needs to developmental levels, including biochemical and physiological structure/function of the body, and have a general understanding of dietary planning that will adequately meet nutritional needs of given levels; (3) the student will be able to describe the importance of environment, feeding skills, psychosocial situations, and other factors to total nutrition and eating habits through the life cycle (development through aging); (4) the student will be able to identify risk factors associated with major health problems over the life span and acquire appropriate knowledge for addressing through dietary and lifestyle choices; (5) the student will be able to select, utilize, and evaluate appropriate materials and methods for communication of nutrition information to a given audience; (6) the student will be able to evaluate dietary intakes and feeding programs for individuals throughout the life cycle; and (7) the student will effectively communicate knowledge through exams, writing, and/or oral projects.
Prerequisite(s): (BIOL 107 or BIOL 115) and (FST 201 or FST 401 or FPE 201 or FPE 401)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

FDSN 301
Exploring Food Science & Tech
In this course students will explore the wide array of disciplines in which engineering, biological, and physical sciences are used to study and produce food products. An overview of the relationship between food nutrition, chemistry, microbiology, safety, processing, engineering, sensory, and product development will be discussed. The food science and technology industry will be studied to understand food processing, food safety, quality and packaging of specific categories of foods. The course also provides a brief introduction to different career opportunities within the food and technology industry.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 304
Food Biotechnology
This course is designed for undergraduate students to learn various biotechnologies and applications used by modern food industry. These may include but limited to genetic engineering of microorganisms, polymerase chain reaction, molecular detection, DNA fingerprinting, and epidemiology of foodborne pathogen, genetically modified organisms (GMOs), food plant biotechnology, dairy and animal biotechnology, biotechnology in fermentation industry and dietary supplements, consumer perspectives and governmental regulations of GMOs, organic foods and more. Also covered in this course: fundamentals of microbial genomics and proteomics, introduction of bioinformatics tools including database search, gene prediction, PCR primer design, structural and functional prediction of proteins. Also examined are applications of high-throughput sequencing technology and data security in food safety and public health sectors.
Prerequisite(s): BIOL 210
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 310
Food Chemistry with Lab
The course applies basic scientific principles to food systems and practical applications. Chemical/biochemical reactions of carbohydrates, lipids, proteins, and other constituents in fresh and processed foods are discussed with respect to food quality. Reaction conditions and processes that affect color, flavor, aroma, texture, nutrition, and safety of food are emphasized. Other topics include activation and control of enzymatic reactions in fruits and vegetables; consequences of water migration on food quality; gelatinization#retrogradation in starch#based foods (e.g., pudding, bread, and rice); initiation and control of non#enzymatic browning (e.g.,pretzels, meat); food emulsions (e.g., salad dressings, commutated meats products), crystal structures in foods and general properties of food materials. The interaction of food components with packaging and the environment will be examined.
Prerequisite(s): CHEM 237
Lecture: 2 **Lab:** 1 **Credits:** 3

FDSN 311
Food Analysis and Properties
In this course students will learn about the physical and chemical properties of foods that can be instrumentally measured as a means to derive product and ingredient specifications. Such measurements enable the food industry to define foods on an objective basis and meet regulatory requirements for food labeling. Properties such as color, acidity, total solids, viscosity, water activity, particle size and moisture content will be demonstrated in a hands-on lab experience setting. This course will also cover the types of instrumentation used for nutritional label contents (protein, fat, sugars, salt etc.) versus that used for research purposes and trouble-shooting for product design issues.
Lecture: 2 **Lab:** 1 **Credits:** 3

FDSN 312
Food and Natural Products Toxicology
Food toxicology is concerned with assessing the injurious effects on living systems of chemicals present in foods. The chemical agents can be man-made (e.g., pesticide residues, food additives, contaminants originating with processing machinery, or packaging materials) or of natural origin (e.g., microbial, animal or plant derived). They can also be generated in the course of preparing, processing, and preserving foods (e.g., mutagens and carcinogens). This course presents the chemical and biological principles that determine toxicity and, by presenting typical examples of the toxic substances found in foods, it hopes to let students become familiar with their properties, modes of action, and methods of analysis.
Prerequisite(s): CHEM 237 and BIOL 107
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 314
Sustainable Food Systems
This course is designed to give students an appreciation of the complex intersections and relationships among food and culture, economics, the environment, labor, policy, population health, and social justice. Students will have opportunities to work on projects that model and analyze these relationships, and consider trade-offs impacting production and consumption, global nutrition and health, scarcity in resources, and more. Students will visit urban and rural farms, introduced to alternative farming techniques and their challenges, how sustainability is measured and reported in the food and related industries.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 316
Cultural Foods with Lab
This course examines the regional, ethnic, cultural, religious, historical and social influences on food patterns and cuisine. Students will study cultural food and nutrition principles related to the following topics: Food as identity and food in social organization; Evolutionary and revolutionary developments in food and cuisine; Food as spectacle; Food technology in non-industrialized and industrialized food systems; Food and health: political inputs and obesity; Food branding and marketing; Food in world religions; Global hunger: root causes and proposed solutions; Hunger in America; and Food and social change.
Lecture: 2 **Lab:** 1 **Credits:** 3

FDSN 318
Culinary Entrepreneurship
This course surveys the new trends in food business entrepreneurship from a culinary perspective. Guest speakers with backgrounds in food science and culinary arts will review the steps in taking a kitchen recipe concept into the local marketplace. Topics will include formulating your business plan, preparing the product pitch for investors, choosing when to work with a shared kitchen versus a food incubator space, when and how to use consultants, building a support team and how to scale the product. Local chef and food entrepreneurs will co-instruct this course and students will visit several of Chicago's start-up entrepreneurial centers.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 320
Food Law, Labels, and Health Claims
This course is designed to give students an in depth understanding of food laws and regulations that govern the food and dietary supplement industries. Students will apply their knowledge in simulated and real world experiences preparing students for rigid food safety requirements and navigating the complex landscape of food labels, including Health and related claims and communications.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 401
Nutrition, Metabolism, and Health
Study of chemical structures, types, and metabolism of carbohydrates, lipids, and proteins. Discussion of the biological and chemical roles of vitamins and minerals. Application and integration of metabolic knowledge with health promotion and chronic disease.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 402
Development, Delivery, and Dissemination
This course is an introduction to writing and presenting on scientific research with a focus on skills necessary for research at IIT's Institute for Food Safety and Health. Topics will include defining a problem, structuring a literature review, creating a research proposal, and written and oral presentation of research results.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 405
Food and Behavior
The course aims to develop an understanding of food and food intake behavior by examining the intersection of nutritional science with other disciplines and expertise. The course will be an analysis of the factors that impact food choice/intake. Examination of physiological regulation, physiological and psychological moderators, food marketing, technology, economics, food policy and regulations, media, food safety, and agricultural practices as well as how food intake behavior feeds back and influences these factors. Influence of sex, BMI, and age will also be considered.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 408
Food Product Development
Students in this class will learn how to do the following: identify the key steps in the food product development process and stage gate concepts; develop a formulation approach with ability to effectively understand how to work well with vendors, handle labeling regulations, food safety, and consumer acceptability requirements; create a product unit costing with trade-offs and contingencies for market launch; identify key performance requirements for product shelf life testing and packaging specifications; evaluate product quality and safety with traditional and state of the art assessment tools; how to conduct consumer tests, plant trials, and introduce new products and processes into the manufacturing operation and contingency planning; and develop a strategy to monitor and improve product performance.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 410
Food Plant Operations
The food processing line types for the major food and beverage manufacturing segments are reviewed as integrated systems. The unit operations specific to each of the dairy, meat, poultry, seafood, juice, bakery and produce industries are reviewed. Students will each draft their own virtual commercial plant layout using vendor equipment specifications with principles of mass balance of material inputs and outputs. Industry guest speakers and trips to local food plants will provide real-world exposure to current manufacturing issues. Principles of plant layout for Good Manufacturing Practices, sanitation, and material flow through the plant will be highlighted. Trends in digitalization of the food plant and plant operations using Industry 4.0 concepts will be discussed.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 411
Food Microbiology with Laboratory
In this course, students will build upon the basic principles of microbiology. Students will explore the intrinsic and extrinsic parameters that affect microbial survival, growth, and inactivation. Students will learn about beneficial bacteria used as probiotics and fermentative microorganisms. Students will learn about foodborne spoilage microorganisms associated with common food commodities. Major foodborne pathogenic microorganisms (their habitats, dissemination, symptoms, and potential mitigation strategies) will be discussed in depth. Methods to assess the microbiological quality and safety of foods will be investigated via hands on experimentation.
Prerequisite(s): BIOL 210
Lecture: 3 **Lab:** 1 **Credits:** 4

FDSN 412
Preservation Processing
This course will cover the fundamental aspects of food preservation, various methods used in food preservation, and engineering calculations related to preservation processing. Perishability of different categories of food products, shelf life, microbial growth and spoilage in foods; Principles of mass and energy balance, heat transfer, and fluid flow; preservation by heat (canning, blanching, pasteurization); preservation by additives (chemical preservatives, antimicrobials, bio preservatives), preservation by pH (addition of acids, fermentation), novel methods of food preservation; preservation by temperature reduction (freezing, refrigeration); thermal process engineering calculations; preservation by water activity (dehydration, drying, evaporation, the addition of salt or sugar); preservation by other conventional methods (smoking, pickling, etc.); food packaging as a preservation aid; preservation by novel food processing technologies; special considerations for the preservation of various food products; validation of preservation.
Prerequisite(s): PHYS 123
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 413
Food Fermentation (w/lab and plant field trips)
Role and history of fermentation; the role of microorganisms in fermentation; microbial growth kinetics during food fermentation; biological pathways in fermentation; factors affecting fermentation; fermented food products; industrial-scale fermentation; operation of fermenter; the role of sterilization in fermentation; design of a fermenter; role of different types of fermentation (alkaline, alcoholic, acetic acid, high salt, savory fermentation). Students will explore processing of fermented foods via in class and hands on learning experiences.
Prerequisite(s): CHEM 237 and BIOL 210
Lecture: 2 **Lab:** 1 **Credits:** 3

FDSN 417
Management of Food Quality Control
This course centers on the modern food processing facility which requires full time quality control management. A unique QC lab mock-up is used to provide a hands-on training experience to prepare the student for management of a QC lab. Taught by faculty with in-plant experience, students will learn how to select and integrate modern ingredient and finished product test methods with operational data from the production line. Statistical Process Control (SPC) charting methods, design of sampling protocols, handling of retention samples, dealing with product recall plans, record keeping and management of consumer complaint data will be discussed.
Prerequisite(s): FDSN 311*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 418
Introduction to Food Design
Food design is a relatively new field to the food industry but is increasingly a critical aspect of bringing a successful food product to market. Students will learn the basic tools of human centric design thinking. This will include how to gain insights from observing and listening to the consumer. Skills for understanding unmet needs and how to frame the problem will be taught through team product design challenges sourced from the local community. Teams will have the opportunity to validate their design concepts to invited industry mentors. This course is co-taught with the IIT Design Institute in the Kaplan Institute.
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 420
US Food Safety Regulatory Systems
This course gives a broad overview of the food safety regulatory systems in the US. It will cover the roles of FDA, USDA, EPA, CDC, DoC in regulating the production and sale of food. Regulations covered include Low Acid Canned Foods, HACCP, dietary supplements, infant formula, food additives and packaging, and the six parts of the Food Safety Modernization Act (FSMA).
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 430
FDSN Capstone
Students choose one of two options based on area of focus: FSMA or Human Nutrition. The FSMA capstone will include hands-on team-based practical experience implementing the Food Safety Modernization Act (FSMA) Preventative Controls for Human Foods. The experience will involve the drafting a food safety plan consistent with current laws and regulations. The Human Nutrition capstone will be a hands-on team-based practicum designing foods for specific claims petition, including developing validation strategy and drafting appropriate claims petition consistent with current law/regulations.
Prerequisite(s): FDSN 420 or (FDSN 405 and FDSN 401)
Lecture: 3 **Lab:** 0 **Credits:** 3

FDSN 494
Special Projects
Advanced projects in food processing and packaging, food microbiology and safety, food chemistry, and nutrition.
Credit: Variable

General Engineering (ENGR)

ENGR 100
Engineering Physics
The overall objective of the course is to prepare secondary school students to be successful in a typical university freshmen-level introduction to engineering curriculum. Students will use hands-on project work, presentations, and discussion to gain a broad perspective of a number of individual engineering disciplines. Students will understand and apply the various aspects of the engineering design process, understand and apply creative and analytical problem solving methods to various situations and improve their ability to use technical-based communication. The format of projects will be written, oral, or graphical.
Lecture: 3 **Lab:** 0 **Credits:** 3

ENGR 101
Transition to Engineering: Explore Armour
This course introduces students to the various engineering disciplines offered at Illinois Tech. Speakers (faculty and expert guest speaker) will address the student cohort to discuss the various engineering disciplines and opportunities working as an engineer, to build a successful career in a rewarding profession. Students will have the opportunity to visit the educational and research facilities at the Illiois Tech Chicago campus, get familiar with Illinois Tech campus and community, and to participate in various activities, projects, and events within the Armour College of Engineering (ACE). Admitted to guaranteed admission program for engineering.
Lecture: .5 **Lab:** 0 **Credits:** 0

ENGR 111
Introduction to Engineering and Design
This course introduces the student to the basic concepts and practices common to engineering. The engineering design process is presented through examples and hands-on projects. Along with fundamental engineering principles, communication skills, computer applications, and professional ethics will be included. Upon successful completion, the student will have been provided a foundation for further study in engineering.
Lecture: 2 **Lab:** 0 **Credits:** 2

ENGR 112
Introduction to Robotics
Introductory experience to the field of robotics. Included in this experience will be the engineering design process, a university-level programming language, and open-ended problem solving strategies. Students, working in small hands-on teams, will be presented with several authentic design challenges. To meet these challenges, students will design, build, and program an appropriate LEGO® EV3 robot with National Instruments LabVIEW software. Teams will document and present their design solutions. Additional topics may include motor control, gear ratios, torque, friction, sensors, timing, program loops, logic gates, decision-making, and timing sequences. The course incorporates Next Generation Science Standards (NGSS).
Lecture: 2 **Lab:** 0 **Credits:** 2

ENGR 198

Research Immersion: Group

This course introduces students to the various engineering disciplines offered at Illinois Tech. Speakers (faculty and expert guest speaker) will address the student cohort to discuss the various engineering disciplines and opportunities working as an engineer, to build a successful career in a rewarding profession. Students will have the opportunity to visit the educational and research facilities at the Illiois Tech Chicago campus, get familiar with Illinois Tech campus and community, and to participate in various activities, projects, and events within the Armour College of Engineering (ACE). Admitted to guaranteed admission program for engineering.

Lecture: 0 **Lab:** 9 **Credits:** 3

Satisfies: Ethics (E)

ENGR 199

Engineering Research Immersion: Individual

This course provides a faculty-mentored immersive individual research experience. Research topics are determined by the faculty mentor's area of research. In addition to the mentored research, students participate in seminars, prepare a written report of their research findings, and present their research findings at a poster expo. Students will receive assignments consistent with their academic level. Open to advanced high school and incoming engineering students with appropriate background for the research topic. Students must apply to the course. Only students who apply to the course and are selected by the instructor will be allowed to register for the course.

Lecture: 0 **Lab:** 9 **Credits:** 3

Satisfies: Ethics (E)

ENGR 200

Entrepreneurship NOW! -- Introduction to the Entrepreneurial Mind Set

This course introduces students to the basic skill set that changes a student's perspective from one of passive reception and learning to active participation and purposeful exploration to create value. This is a hands-on course where students learn to climb Mount Everest as a team, learn and practice the five disciplines for creating value, spark creativity and invention, learn the IIT-way to design, prototype, prototype and prototype, elevator pitching, and practice what they have learned by competing in a mini-innovation chase. The winners receive free courses at IIT to continue their journey to perfect the entrepreneurial mind set.

Lecture: 0 **Lab:** 4 **Credits:** 2

ENGR 411

Fabrication Practices for Engineers

The course will provide an overview of standard shop practices, machining theory, measurement, mechanical drawing, dimensioning requirements, tolerances, material selection, fastener selection, and shop safety. This course will provide basic instruction on the proper use and complimentary capabilities of standard machine tools. Hand tools, drill press, lathe, mill, band saw, CNC machines, laser cutters and 3D printers will be used by students. Students will fabricate a variety of parts that will demonstrate the capabilities of individual machine tools.

Lecture: 0 **Lab:** 5 **Credits:** 2

ENGR 494

Undergraduate Research Immersion: Team

This course provides a faculty-mentored immersive research experience as a part of a student team. Research topics are determined by faculty mentor's area of research. Open only to engineering students with appropriate background for the research topic. Students must apply to the course. Only students who apply to the course and are selected by the instructor will be allowed to register for the course.

Lecture: 0 **Lab:** 10 **Credits:** 3

ENGR 495

Undergraduate Research Immersion: Individual

This course provides individually-based faculty-mentored immersive research experience. Research topics are determined by faculty mentor's area of research. Open only to engineering students with appropriate background for the research topic. Students must apply to the course. Only students who apply to the course and are selected by the instructor will be allowed to register for the course.

Lecture: 0 **Lab:** 10 **Credits:** 3

ENGR 496

Practical Engineering Training

This course is a mentored, immersive practical engineering training. Students learn under the direction of professional engineers and practicing engineers by working on real engineering projects. The student will perform hands-on engineering, including learning and developing/applying engineering principles and concepts to complete the project assigned to the student. The student will apply engineering ethics and safety during their practical engineering training. Students will communicate the results of their work in written and oral communications. Students will receive assignments of varying complexity consistent with their undergraduate standing.

Lecture: 0 **Lab:** 9 **Credits:** 3

ENGR 497

Special Topics: Introduction to Research

This course introduces students to research methods, techniques for measurement and data analysis, lab safety, and contemporary issues related to research in a university setting. Students will be introduced to research proposal development, scientific literature reviews, measurement techniques, statistical data analysis, design of experiments, good laboratory practice, and proper presentation techniques. Ethics and intellectual property topics related to research will also be covered. During this course, students will be involved in hands-on experimentation in order to practice their measurement and data analysis skills as well as test their hypotheses. Experiments will focus on the engineering themes of energy, water, health, and security.

Lecture: 0 **Lab:** 3 **Credits:** 3

ENGR 498

Undergraduate Research Immersion: Team

This course provides a faculty-mentored immersive research experience as a part of a student team. Research topics are determined by faculty mentor's area of research.

Lecture: 0 **Lab:** 6 **Credits:** 3

ENGR 499
Undergraduate Research Immersion: Individual
This course provides a faculty-mentored immersive research experience. Research topics are determined by faculty mentor's area of research.
Lecture: 0 **Lab:** 6 **Credits:** 3

History (HIST)

HIST 305
Latin America: 1810-Present
The history of Latin America from colonial times emphasizing the political evolution of the several republics. Special consideration will be given to the political, economic, military, and social relations of the U.S. with Latin American countries in the 20th century.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 306
Women in Latin American History
This course will students understand how ideas about gender have shaped the lives of women and men in Latin America and how women and men have, in turn, influenced ideas about gender. The course will improve students ability to understand and analyze historical documents, processes, and writings, and will improve students' verbal and written skills though public speaking and writing.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 307
Latin American History Through Film
An overview of the historical development of Latin American film, from early to contemporary films, along with a study of the methods of critical inquiry developed to analyze film and cultural and political history in Latin America. This course provides differing visions of Latin American history as constructed through film. We analyze some of the major films of Latin American cinema with a view to the characteristic marks of this cinema, its aesthetic, major themes, the various ways that it impacts political, social and cultural systems and how social-political changes in turn impact the production and politics of film. Films will be in Spanish and English subtitles.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 311
Twentieth Century Europe: 1890-1945
Nationalism and nation states; patterns of diplomacy; origins, conduct, and settlement of World War I; Russian Revolution; fate of democracy; rise of totalitarianism; World War II and the Holocaust.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 321
World Religions I: Christianity, Islam, and Hinduism
The history of the "Big 3" of the world's religions -- Christianity, Islam, and Hinduism -- is traced from antiquity to the present day. Key individuals, texts, theological innovations, and reformations will be discussed and analyzed. This is predominantly a lecture-style course, although there will be occasional class discussions on primary or secondary religious texts. May not be taken for credit by students who have completed HIST 380 World Religions I.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 322
World Religions II: Judaism, Buddhism, and Nature Religions
The history of Judaism, Buddhism, and a number of faiths with a similar worldview that have been placed under the heading of Nature Religions is traced from antiquity to the present day. Key individuals, texts, theological innovations, and reformations will be discussed and analyzed. This is predominantly a lecture-style course, although there will be occasional class discussions on primary or secondary religious texts. May not be taken for credit by students who have completed HIST 380 World Religions II.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 332
United States Women's History
An examination of how women shaped the course of US history and of how key political and social events shaped their lives. Since no single experience conveys the history of all American women, this course will discuss the diverse realities of women of different races, classes, ethnicities, and political tendencies. It looks at how and why the conditions, representations, and identities of women changed or remained the same. By incorporating women into our vision of history, we develop a more complete understanding of our past.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 333
Ethnicity in American History and Life
Examines the creation of the American nationality from its diverse roots, which include almost all the world's great cultures. Special stress on immigration, African American history, and the relationships among concepts of race, class, and gender.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Humanities (H)

HIST 334
The Creation of America: The New World to 1789
Examines how the U.S., its values, and its institutions came to be. Colonization, "Indian" relations, slavery, the American Revolution and the Constitution are studied in the context of the colonial world, including Latin America. Controversial issues and the challenge of discovery are stressed.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 336
The Industrialization of America: 1789-1898
Traces America's transformation from agrarian republic to Industrial Empire. Stresses impact of industrialization on all aspects of life, the nature of slavery, the failures of "Reconstruction", and the western and urban frontiers. Explores the adventures that made America a great power.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 337
The American Century: 1898-1975
Traces how America attained economic and military power and what it did with that power at home and abroad. Discusses the World Wars, the Great Depression, the limits of the "welfare state," the movement for Black equality, and the transformations of the 1960's.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 338
Contemporary America: 1960 and After
Explores the historical roots of contemporary issues. Topics vary by semester but always include the Cold War and America's international position, tensions over immigration and racial integration, and the historic roots of changes in popular culture and daily life.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 340
Rise of Global Economy
A historical analysis of contemporary globalization in trade, technology, labor, and culture. The course includes a comparative analysis of the world's leading economies (e.g. Great Britain, Germany, United States, and Japan), and considers their varied responses to industrial revolutions in the past two centuries.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 343
Islam in the Modern Era
This course will examine the philosophical, theological, and legal roots of Islam from Mohammed to the present. We will focus on what it means to be Islamic in the Middle East, what it means to practice Islam in a Western culture, and the ways in which individuals who practice Islam are affected by Western ideology: both theological (i.e. Judeo-Christian) ideations as well as Western notions of civil liberties dating as far back as the Magna Carta and even to first century Roman law.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 344
History of the Ancient Mediterranean
Students gain an understanding of the history and culture of Greece, Rome, and ancient Palestine. Walk a mile in someone else's sandals while tracing the early foundations of Western culture. Using disciplined analysis and creative interpretation to reconstruct aspects of ancient civilizations, students are challenged to escape their own personal and cultural perspectives.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 345
Women and the World: 20th Century
This course examines how women in different regions of the world have helped to shape their nation's society and history. It also explores the connections and/or lack of connections between women, women's movements, and key political events during the twentieth century. The course will both draw some general themes and look at some specific case studies.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 349
African American Experience
A study of the African-American experience since 1800, including African roots, formal and informal institutions of oppression, change in continuity in folk culture, and history of social institutions.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 350
US Urban History
Basic facts and issues of U.S. urban history; reasons for the growth, development, and decay of cities; origins of contemporary urban political, social, and economic problems.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 351
The City in World History
This course explores the city throughout world history as both place and space. The course begins by examining the early history of cities in the ancient world around the globe and then moves across time to examine the medieval, early modern, and modern/contemporary city. By the end of the course students will be expected to understand how and why cities have been constructed and how cities and the idea of the city have, over time, been historically interconnected even before the global urban world of today.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 352
History of Chicago
Basic institutions of the contemporary city studied in their historical context, using Chicago as a case study. Political machines, social and political reform traditions, planning agencies, ethnic neighborhoods, organized crime and many other urban institutions.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 355
Digital Labor
What is digital labor? Since the mid-twentieth century, labor forces have radically changed in relation to new digital, electronic computing technologies. Perhaps the clearest example of this change is the evolution of computer programming as a respected and highly paid profession. But those who work directly with computers are not the only ones affected. As computing systems have steadily reorganized aspects of society, the idea of what counts as labor has changed. This course introduces students to historical and contemporary issues in the history of technology to explain how our national and global work forces are shaped by digital, electronic technology. We will look at everything from World War II electronic codebreaking to present-day struggles over net neutrality. We will also look at the "hidden labor" behind our digital technologies, from hardware's origins in African mines and Chinese factories to the strenuous manual and psychological labor hidden in the back-ends of many of our favorite online services. Throughout, students will learn how seemingly unrelated changes share a common history. The course will include several guest lecturers from academia and industry. Students will be asked to write papers, do multimedia projects, and engage with their classmates in group projects.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 361
The Atomic Age
A historical inquiry into the development of nuclear energy, its military uses, policy formation, and the attendant problems. Topics included: Manhattan Project, decision to use the bomb, legislation, AEC, arms race, testing, fallout, civil defense, disarmament efforts, foreign programs, espionage. This upper level course is reading intensive. Students are expected to read the required materials for discussion. A mid-term and final examination will assess student understanding of the nuclear issues. A research paper on an approved topic will comprise the remainder of requirements. There are also several films included for this class.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 372
History of Engineering
Examines the birth and evolution of professional engineering. Topics include engineering education, professional standards, industrial and government contexts, distinctive modes of thinking, and engineering in popular culture.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 373
History of Video Games
This course introduces students to the history of video gaming while providing instruction in scholarly practice with an emphasis on research and writing. Topics include the technical and cultural history of the video games, academic writing, and humanities research methods.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Credit: Variable
Satisfies: Communications (C), Humanities (H)

HIST 374
Disasters!
This course investigates different disasters throughout history to show how disasters catalyze legislative and technological change. Since our understanding of what constitutes a disaster is constructed through public discourse and popular media, this course will employ a variety of media and teaching techniques. In addition to discussion, lecture, and required readings, students will watch documentaries and read news articles to piece together the histories of regulatory changes effected by disasters in the realms of power production, environmental stewardship, manufacturing, transportation, infrastructure, public health, reproduction, food production, and more.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Ethics (E), Humanities (H)

HIST 375
History of Computing
This course addresses the question "How do technologies change the world?" through examining the history of computing. Readings and discussions on the people, technologies, ideas, and institutions of modern computing; and the uses of computers in computation, control, simulation, communication, and recreation. We'll learn about hardware heavyweights, software moguls, and where the World Wide Web came from.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 377
Filming the Past
How does history become known, and how do certain accounts become popularized as the truth or "common knowledge"? What role do visual media, particularly films and documentaries, play in the process of creating and understanding our shared past? Can film be a force for uncovering and popularizing "hidden" histories that upset our assumptions about the past? This course takes a novel approach to less well-known chapters in history by looking at how films and documentaries can be tools for disseminating historical knowledge and how they can also be activist interventions in how we understand the past and its relationship to the society we live in today. Throughout the course, we will watch films and documentaries that try to answer the questions posed above, and we will read historical accounts of the events they convey. Students will learn how to write a short history from primary documents and then transfer it to an audio or a visual medium. This will result in 2 projects: a short podcast and a short documentary film on a historical topic.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 380
Topics in History
An investigation into a topic of current or enduring interest in history, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 381
Science in Industrial Society: 1750-1900
The transformation of the physical and biological sciences from the Enlightenment to the 20th Century and its effects on culture, politics, and belief; the creation of science-based technologies and the creation of the profession of scientist.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 382
Technology in History: 1500-1850
Explores the process of technological change during the birth of industrial societies. Considers the context of early industrial development in Europe, then examines the industrial revolution in Britain and America. Concludes by assessing technology's role in European domination of Asia and Africa.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 383
Technology in History: 1850 to Present
Examines technological change as a characteristic activity of modern societies. Investigates the science-based "second" Industrial Revolution in Europe and America. Explores the varied responses of artists, writers, architects, and philosophers to the machine age. Concludes by discussing technology's place in the modern nation-state.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 384
Science in the Twentieth Century
Development of quantum theory, relativity, and molecular biology; the growth of science to its present important position in government, economic life, and technological development.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 385
Women in Computing History
Did you know that programming used to be a feminized field? For decades the history of computing has been a collection of stories of "great men" and the machines they designed. Yet, from the earliest days of computerization, women have played a major role in computing's history. These stories have often been submerged, and historians have only recently begun to write them back into the main narrative of the history of computing. Today, this is changing what we think we know about technology's past and how we see our own interactions with it. In this course, students will look at the history of computing through the eyes of women pioneers -- some famous, some ordinary -- and discuss why we haven't heard very much about this history until now. The class will help you better understand why gender, sexuality, and race play an important role in where computing has been and where it is going and, even more importantly, how technological change is interdependent with social categories.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 387
History of 20th Century Medical Technology: Artificial Organs I
Students will be provided an opportunity to explore a unique aspect of 20th century medical technology. The complex nature of medical technological development crosses the scientific, engineering, political, economic and clinical boundaries. This focused examination provides a historic setting to better understand the inter-disciplinary nature of the medical and scientific communities in the 20th century. Historic critical analysis encompasses the clinical, scientific bases, and technical components of audiology technology and cochlear implants, joint replacement and prostheses, corneal/retinal replacements and artificial eyes, and cardiac pacemakers. The class is based on the literature contained in the many specialty journals that commonly include historic, biographical and autobiographical articles written largely in non-technical terms. Physiological explanation is provided in class.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Humanities (H)

HIST 388
History of Artificial Organs
Students will be provided an opportunity to explore a unique aspect of 20th century medical technology. The complex nature of medical technological development crosses the scientific, engineering, political, economic, and clinical boundaries. The emergence of artificial organs is a focal theme in the delivery of modern medical science over the last 60 years. This concentrated examination provides a historic setting to better understand the inter-disciplinary nature of the medical and scientific communities in the 20th century. The medical science community is particularly sensitive to their historic development. The many specialty journals commonly include historic, biographical, and autobiographical articles that reflect this consciousness. They are written largely in non-technical terms and are accessible by the general population. Physiological explanation is provided in class.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HIST 491
Independent Reading and Research
Consent of department. For advanced students.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Credit: Variable
Satisfies: Humanities (H)

Humanities (HUM)

HUM 200
Topics in Humanities
One-time or initial versions of course topics equivalent to HUM 202, 204, 206, and 208. Topics will introduce students to the humanities at IIT and to provide intensive instruction in writing.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 202
Industrial Culture
An interdisciplinary course that examines the development of modern industrial society and the impact of science and technology on our culture. Readings drawn from history, literature, and philosophy. This course is also writing instruction intensive.
Prerequisite(s): COM 101 or COM 111 or IIT Communication Placement score of 102
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 204
Age of Darwin
An introduction to the humanities through an investigation of important changes in our culture associated with Darwin's theory of evolution. Readings drawn from literature, philosophy, and science. This course is also writing instruction intensive.
Prerequisite(s): COM 101 or COM 111 or IIT Communication Placement score of 102
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 206
Life Stories
An interdisciplinary study of biographies and autobiographies. In addition to considering such works as a genre, the course examines the historical events and the philosophical issues that have shaped the lives and attitudes of the writers/subjects. This course is also writing instruction intensive.
Prerequisite(s): COM 101 or COM 111 or IIT Communication Placement score of 102
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 208
Digital Culture
Introduces major topics in digital culture while providing instruction in scholarly practice with emphasis on research and writing. Topics include technical and cultural history of the internet, academic writing, and humanities research methods.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 250
Introduction to Science, Technology, and Society
The growth of scientific knowledge and technology and the ways in which it has been produced have historically been intertwined with the development of culture and society. The effects are felt in all aspects of human identity and interests: from the ways we live our everyday lives, to our understanding of who and what we are, to the making of political decisions of global proportions. This course prepares students to think critically about the cultures, beliefs, human relationships, and institutions that make and are remade by scientific and technological change.
Lecture: 3 **Lab:** 0 **Credits:** 3

HUM 321
Introduction to Women's Studies
Introduction to Women's Studies is an interdisciplinary course with an American lens that draws on feminist ideas and scholarship to develop a set of tools for analyzing women's experiences in social, cultural, and political contexts. The course aims to sharpen students' critical awareness of how gender operates in institutional and cultural contexts and in their own lives as well as to give them an opportunity to imagine participating in social change. May not be taken for credit by students who have completed HUM 380 Introduction to Women's Studies.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Humanities (H)

HUM 352
Gender and Technological Change
Have you ever wondered why more men choose to portray themselves as women online than the reverse? Or why there are more boys than girls in China? Or why vibrator technology was seen as a medical necessity in the 19th century? Have you ever thought about how the interplay between technology and gender constructs everything from our modern military to how we choose to spend our free time? To where we work? This course explores the history of technology by using gender as a category of analysis. It also looks at how technological objects and tools participate in molding elements of our culture that we may take for granted as logical or timeless. By looking at change over time, we will analyze the different ways technology affects how we live and see ourselves and how gender defines technological priorities.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Ethics (E), Humanities (H)

HUM 354
Science and Technology Studies
This course focuses on the latest work in science and technology studies and the history of technology from ethics in genetic engineering to the social dimensions of computing. Other topics include the intersection of gender and sexuality with new technologies, the role of communications media in "rewiring" our brains and our social connections, and the role of the world wide web in constructing national and global technocracy. Students will read and discuss works by academics as well as journalists in order to offer grounding in the historical, social, and economic background of key technical topics and the presentation of technical topics for wider audiences. Students will also learn about the ways in which authors leverage different information technologies to communicate to wider audiences and how those methods are evolving.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Ethics (E), Humanities (H)

HUM 371
Fundamentals of Game Design
This course introduces students to fundamental principles and practices in the design of games. Students complete readings and workshop activities related to design principles and game mechanics and complete individual and group design projects.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 372
Interactive Storytelling
Interactive Storytelling is an upper-level communication course that examines methods and forms of interactive storytelling while engaging students in hands-on production projects.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 380
Topics in Humanities
An investigation into a topic of current or enduring interest in the humanities, which does not fit neatly into standard categories.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement and (HUM 102 or HUM 104 or HUM 106 or HUM 200-299)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

HUM 491
Independent Reading/Research
Independent reading or research.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Credit: Variable
Satisfies: Humanities (H)

HUM 498
Undergraduate Research Immersion Team
Summer research for undergraduate students in IIE/BSMP.
Lecture: 3 **Lab:** 0 **Credits:** 3

Industrial Tech and Mgmt (INTM)

INTM 301
Communications for the Workplace
Review, analyze and practice verbal and written communication formats found in the workplace. Emphasis is on developing skills in technical writing, oral presentations, business correspondence, and interpersonal communication using electronic and traditional media. Credit not granted for both INTM 301 and COM 421.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 315
Industrial Enterprises
An introduction to the world of industrial enterprises and the organizational priorities required to achieve efficiency and competitiveness. Students learn to assess the present state of a company, address performance issues, foster functional communication and cooperation between departments, identify sources and impacts of waste, identify value-added activities, and transform outdated business practices into flexible, customer-driven processes.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 319
Electronics in Industry
Basic overview of electrical and electronic technology in industry. Emphasis on electrical and electronic components, industrial devices, electrical theory, application and basic troubleshooting. Students select and complete an electrical or electronic class project.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 322
Industrial Project Management
Projects are the driving force behind innovation and improvement in any organization. This course identifies the tools and techniques needed to lead any project to its intended conclusion. Topics include project plans, managing expectations and contingencies, building a winning team, gaining commitments, managing project risks, and development of personal skills critical to the successful project manager.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 404
Marketing, Sales, and Product Introduction
This course examines marketing and sales and the differences and details of these activities as applied within industry. The range of marketing types is covered to include business-to-business, industrial, commercial, retail, internet, social media, and entrepreneurial/professional. Sales fundamentals include understanding the customer and the competition, sales strategy, sales management, product positioning, product life cycle, sales structures, margins, and prospecting for new customers. Product development is addressed throughout the course inclusive of market feedback, product evaluation, opportunity assessment, prototyping, field trials and market testing, and product launch.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 405
Maintenance Technology and Management
Maintenance of facilities and building systems is a major concern for all industrial operations. Facility managers must maintain heating, ventilation, air conditioning, plumbing, fire-life safety, electrical and other building systems, many of which are interrelated. Dysfunction in one system can cause problems in another, leading to occupant discomfort, poor energy efficiency and premature equipment failure. Equipment maintenance techniques have evolved to include more scientific diagnosis for increased uptime reliability. Preventive, predictive and prescriptive maintenance command a high percentage of modern behaviors to keep facilities running at peak efficiency. This course blends both the technical and managerial sides of maintenance with a focus on procedural analysis.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 406
Quality Management Systems
This course focuses on how organizations manage quality in a competitive marketplace regardless of the nature of the industry. Students learn how quality is determined, measured, controlled and improved in an organization. Core quality concepts and associated tools are covered, inclusive of quality management principles, various process improvement methodologies, and the role of statistics in decision-making. Quality function deployment, value stream mapping, process capability, measurement system analysis, risk assessment using Failure Mode and Effects Analysis (FMEA), hypothesis testing, analysis of variance (ANOVA), design of experiments, and statistical process control (SPC). Students utilize Minitab to explore quality tools and perform data analysis to support decision-making.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 407
Construction Technology
Introduces the full range of technologies involved in construction of both new and modified facilities, including steel, concrete and timber construction as well as supporting specialties such as HVAC, electrical, plumbing, etc. the interaction between the various construction trades will be covered along with the role of the architects and engineers.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 408
Cost Management
This course introduces accounting information used for decision-making within a business enterprise. Financial reporting, financial terminology, and the three major financial statements are reviewed. Product costing, short-term and long-term decision-making, budgeting, control of operations, and performance evaluations are covered as are cost-volume-profit relationships, relevant costs, flexible budgets, and standard costs.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 409
Inventory Control
Fundamentals of inventory control including inventory classifications, i.e. raw materials, work-in-process (WIP), and finished goods. Topics include inventory record keeping, inventory turnover, the 80/20 (or ABC) approach, safety stock, forecasting, dependent and independent demand, lead times, excess/obsolete inventory, and inventory controls. Material Resource Planning (MRP) and Enterprise Resource Planning (ERP) are included.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 410
Operations Management
Focuses on core processes within an organization -- the activities that add value. An operations strategy depends on the industrial sector as well as the organization. This course introduces a variety of qualitative and quantitative tools for such activities as project management, process analysis, job design, forecasting, resource planning, productivity, quality, inventory, and scheduling. The objective of this course is to provide the framework for integrating approaches covered in other INTM courses.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 411
Functional Facilities Management
Covers key activities in facilities management, the role and responsibilities of the facilities manager, and the functional aspects of management and maintenance activities by building type (commercial, high rise, hotels, hospital, data center). Budgeting, strategic planning, and coordination of capital and operating projects; inspection, repair, and renovation of equipment and buildings in accordance with health and safety standards; managing internal staffing, external contractors, insurance and control activities (parking, waste disposal, building security, etc.). Information systems, real estate management, sustainability issues and emergency preparedness also covered.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 413
Contract Administration for Construction Projects
This course covers fundamentals of project administration and characteristics of the construction industry. Pre-construction discussion includes technical and economic feasibility, project delivery systems, documents, bonding, and bidding. Duties and liabilities of parties at pre-contract stage and during contract administration to include scheduling and time extensions, payments, retainage, substantial and final completion, change orders, suspension of work, contract termination, and dispute resolution. Labor law, labor relations, safety, and general management of a construction company.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 415
Advanced Project Management
This course covers project management in the PMP framework and provides a structured approach to managing projects using Microsoft Project and Excel. Coverage includes creation of key project management charts (Gantt, Pert, CPM, timelines and resource utilization), basic statistics used in estimating task times, critical path generation in Excel and Project, project cost justification in Excel, SPC and acceptance sampling for machine acceptance, project analysis via simulation, and management of personnel, teams, subcontractors and vendors. Case studies are utilized to demonstrate core concepts and dynamic scheduling.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 416
Integrated Facilities Management
Integrated Facilities Management involves understanding the processes and tools needed to successfully manage new construction and renovation projects, building systems improvements, ongoing facilities management functions, and integration of new technologies within buildings and infrastructure. Students learn to assess facilities projects, develop project scope, plan for implementation, and create a project team. Explores real world successes and failures in buildings, equipment and technologies. Coursework focuses on completion of a comprehensive project, from conceptualization to development and implementation, inclusive of costing, team building and creating a pitch for project funding to upper management.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 417
Construction Estimating
General approaches for estimating construction costs are covered. Several commercially available software packages are introduced. Emphasis is on acquiring the knowledge required to develop cost estimates for construction, renovation and maintenance projects for buildings, facilities and equipment.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 418
Industrial Risk Management
Each year, industrial companies are affected by critical incidents which cause disruption in operations and significant monetary losses due to repairs and/or lost revenue. Whether it is a small fire, an extended electrical outage or an incident of a more serious magnitude, all company stakeholders - from the board of directors to the employees to the customers - are impacted. The key to understanding the complexities of industrial resiliency lies in focusing on the issues of preparedness: prevention, mitigation, and control. This course is designed to prepare the student for managing a critical incident, including understanding risk and business impact, emergency preparedness, contingency planning and damage control.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 420
Applied Strategies for the Competitive Enterprise
Course covers the application of proven management principles and operational practices. Learn how high performance companies create a competitive advantage despite economic challenges and a transitional customer base. Factors covered include strategy deployment, financial analysis, new product development, quality, customer service, and attaining market leadership. Case studies illustrate variable impacts on business situations.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 423
Sustainable Facilities Operations
Maintaining and managing buildings and facilities is a challenging, multifaceted occupation. Facilities are becoming smarter and greener as the goals of energy conservation and occupant comfort have shifted to include environmental responsibility. This course examines facility operations and management (O&M) related to sustainability and green technology, with an emphasis on the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) requirements, rating system, and the process for properties to apply for certification as a resource-efficient operation.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 425
Human Resource Management
This course will introduce students to key aspects of HR management, including legal requirements for all normal HR activities as well as techniques for dealing with employees when hiring, evaluating, promoting and terminating.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 427
E-Commerce in Marketing and Supply Chain Networks
This course covers electronic commerce and its applications in industrial organizations. Topics covered include the role of e-commerce in a firm's business operations and competitiveness, e-commerce infrastructure technologies, e-commerce applications in product development and marketing, and effective use of e-commerce in supply chain management and collaboration. Innovations in business models, marketing strategies and supply chain processes driven by web-enabled applications are included. Social and ethical challenges posed by the widespread adoption of e-commerce will also be studied.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 430
Transportation
This course covers transportation practices and strategies for the 21st century. The role and importance of transportation in the economy and its relationship to the supply chain will be covered in detail. Transportation modes - trucks, rail, air, and water - will be examined for both domestic and global transportation. Costing and pricing strategies and issues will be discussed as well as security issues in domestic and international transportation.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 432
Sales and Operations Planning
This course covers sales and operations planning (S&OP) processes, objectives, and procedures utilized by leading global supply chain companies. Key elements of the S&OP process are explained, including demand plans, forecasts, and capacity plans. Students also learn how to develop, maintain, and manage supplier relationships (SRM) and how companies use customer relationship management (CRM) tools to enhance business relationships.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 434
Manufacturing 4.0
This course focuses on the Fourth Industrial Revolution (Industry 4.0) and the major manufacturing technologies that must be integrated and implemented effectively in a timely manner in order to sustain a competitive advantage. Advances in product design, breakthrough achievements in materials used in products, and reduced time to market require the use of advanced industrial processes to maximize customer service and company profitability. Topics include: shaping the fourth industrial revolution, manufacturing 4.0, manufacturing economics, manufacturing analytics, supply chain 4.0, quality 4.0, Industrial Internet of Things (IIoT), future of manufacturing skills, advanced manufacturing (digital, automated, additive), AI, augmented reality, modern manufacturing leadership, and change management.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 435
Performance Management in Food Operations
Creating an organization-wide culture of quality and performance is critical to managing the unique demands of a food processing company. Learn how to develop, manage, and improve food production processes, implement lean principles to eliminate waste and improve yields, and measure operational performance. Topics covered include budgeting and financial tools, introducing new food products and processes, Total Quality Management (TQM), evaluation and management of supply chain activities, and strategy deployment techniques.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 436
Lean Manufacturing
Lean principles are the primary continuous improvement tool utilized in the manufacturing industry. In this course, students learn how to evaluate process performance, starting with lean thinking to determine exactly what is needed to achieve the desired outcome of a process and the value it creates. With lean thinking comes the identification of waste, which can take many forms including organizational policies and practices which may not provide any value to the customer. The next step is to map the process as it is in its current state so that potential future state improvements are more easily identified and serve as a catalyst toward achieving process perfection. Diagnostic tools are introduced, both qualitative and quantitative in nature, to help reveal the potential of the process.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 437
Smart Factory Automation
Technology changes how companies operate, impacting internal processes and how comprehensive manufacturing solutions are established to serve customer needs. The challenge lies in connecting independent processes into systems that are reliable, self-adjusting, and communicate in real time. Internal systems must successfully blend hardware, software, sensors and codes, and integrate new technologies to automate, assess and control manufacturing operations. The goal is to achieve a transparent system with faster processing times, fewer interruptions and a more continuous flow, resulting in competitive advantage throughout the entire value stream. This course covers interconnection, optimization and automation of processes to achieve competitive advantage in manufacturing operations.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 438
Advanced Metals Manufacturing I
Today's leading edge manufacturing environment has advanced technology and systems embedded throughout its framework. This course exposes students to the functional aspects and capabilities of a 5-axis CNC machining center, and the processes involved in taking a machined part from prototype to production. This state-of-the-art technology is used by high-production companies around the world to create complex, precision-machined parts and products with tight tolerances and extreme repeatability. Students gain experience using SinuTrain simulators and hands-on learning on a 5-axis CNC machine. Coverage includes CNC programming and use of IIoT system technologies embedded in the machine to obtain internal diagnostics with real time data and connect with internal departments, suppliers and customers. Prior completion of a course in manufacturing processes highly recommended. First course in a two-course sequence.
Lecture: 2 **Lab:** 2 **Credits:** 3

INTM 441
Supply Chain Management
This course covers the full range of activities involved in the supply chain. This includes management tools for optimizing of supply chains, relationships with other parts of the organization, in-house versus third party approaches, and suitable performance measurements. Topics covered include: Warehouse Management Systems (WMS), Transportation Management Systems (TMS), Advanced Planning and Scheduling Systems (APS), as well as cost benefit analysis to determine the most appropriate approach.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 442
Warehousing and Distribution
This course covers warehouse layout and usage based on product requirements such as refrigeration, hazardous material, staging area, and value added activities. Processes covered include receiving, put-away, replenishment, picking and packing. The requirement for multiple trailer/rail cars loading and unloading is considered as well as equipment needed for loading, unloading, and storage. Computer systems for managing the operations are reviewed. Emphasis is on material handling from warehouse arrival through warehouse departure.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 443
Purchasing
Purchasing responsibilities, processes, and procedures are included. Topics covered include: supplier selection and administration, qualification of new suppliers, preparing purchase orders, negotiating price and delivery, strategic customer/vendor relationships, and resolution of problems. All aspects of Supplier Relation Management (SRM) are covered.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 444
Export/Import
Internationalization of industry requires special expertise and knowledge, which must be taken into consideration throughout all interactions with overseas companies either as customers or suppliers. Topics covered include custom clearance, bonded shipping, international shipping options, import financing and letters of credit, customer regulations, insurance, import duties and trade restrictions, exchange rates, and dealing with different cultures.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 446
Manufacturing and Logistics Information Systems
Provides an overview of manufacturing, logistics and supply chain management (SCM) information systems and software packages, as well as practical tools and techniques for effective decision making. Emphasis on the importance of accurate and timely data, efficient business processes, and utilizing state-of-the-art information tools and technologies. Students gain hands-on experience using a modern ERP system to understand the features, functionality, and end-to-end dependencies of the core ERP modules used in an enterprise.
Prerequisite(s): INTM 441
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 448
Agile Methodologies for New Product/Process Development
The development of new products and operational processes in a manufacturing setting requires collaboration and teamwork across multiple departments and flexible (agile) methods to expediently assess product/process viability and implement production without interrupting current operations. This course explores agile methodologies and management strategies involved in developing a new product or process, to include innovation and design, environmental concerns, market analysis, timing, budgets, collaborative strategies, patents and trade secrets, licensing and distribution, and marketing/pricing.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 459
Issues in Industrial Sustainability
Examines the concept of sustainability and its application in the industrial environment. Identifies underlying stresses on natural and human environments and the resultant problems for business and society including legal, ethical, and political issues related to sustainability. Global warming, peak oil, and commodity pricing are considered as indicators of the need for improvements in sustainability. Industrial ecology will be discussed as well as strategies for developing sustainable practices in manufacturing, power generation, construction, architecture, logistics, and environmental quality. Coverage includes case studies on businesses that have developed successful sustainability programs.
Lecture: 3 **Lab:** 0 **Credits:** 3

INTM 460
Sustainability of Critical Materials
This course explores the limitations in supply and the need for sustainable use of carbon and non-carbon-based materials such as oil, minerals, food, water, and other natural resources used by industry. Limitations in the global availability of such resources pose challenges to industry which will require careful consideration and planning to ensure continued prosperity for current and future generations. Course will cover strategies and options to mitigate anticipated shortages and optimize the use of non-renewable natural resources, review of fuel and raw material pricing, and cost/benefit analysis of sustainable development proposals. Technical analyses will be presented during class discussions, but a technical background is not required.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 461
Energy Options for Industry
Carbon-based fuels are a limited resource and within decades will be in very short supply. Associated energy costs will increase and industry will be required to incorporate alternate fuels and/or power sources, such as uranium (for nuclear power), hydroelectric, geothermal, wind, wave, solar, etc. This course presents such energy options and explores the anticipated impact on industry.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 462
Special Topics in Sustainability
This course allows the student to research and report on an industrial sustainability issue of interest and relevance to their career objectives. Topics may touch on industrial ecology, ethics, regulations, environment, resource use, alternative manufacturing methods, facilities, logistics, etc. This is the fourth course in a specialization in Industrial Sustainability.
Lecture: 0 **Lab:** 3 **Credits:** 3

INTM 477
Entrepreneurship in Industry
Introduces various forms of entrepreneurship with emphasis towards industrial organizations. Provides helpful tools for developing and implementing significant "game-changing" actions to effect change within an existing organization or develop a new business venture. Students complete an opportunity assessment (OPASS) project wherein they identify, evaluate, and develop an approach for a "real-life" business and produce a formal report and presentation.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

INTM 491
Undergraduate Research
Undergraduate research.
Credit: Variable

INTM 497
Special Projects INTM
Special projects.
Credit: Variable

INTM 498
Undergraduate Research Experience
Team research experience; topic determined by supervising faculty.
Lecture: 0 **Lab:** 6 **Credits:** 3

Information Tech and Mgmt (ITM)

ITM 100
Introduction to Information Technology as a Profession
Introduces students to the profession of information technology, beginning with concepts of systems, systems theory and modeling, information systems, and system integration. Examines the steps necessary to analyze a business problem and identify and define the computing and information requirements appropriate to its solution, with a focus on how to design, implement, and evaluate a technology-based system to meet desired needs. Students learn to analyze the local and global impact of computing on individuals, organizations, and society. Leads students to recognize of the need for continuing professional development, and imparts an understanding of professional, ethical, legal, security and social issues and responsibilities in information technology. Students write and present, building their ability to communicate effectively with a range of audiences, and using standard planning methodologies design an information system to meet the information needs of a small business.
Prerequisite(s): ITM 301 and (ITM 311 or ITM 312)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITM 300
Communication in the Workplace
Review, analyze and practice verbal and written communication formats found in the workplace. Emphasis on developing skills in technical writing and oral presentations using electronic and traditional media. Credit not granted for both ITM 300 and COM 421. INTM 301 may be substituted for this course.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITM 301
Introduction to Contemporary Operating Systems and Hardware I
Students study the basics of computer architecture and learn to use a contemporary operating system. Hardware requirements, hardware components, software compatibility, and system installation topics are covered along with post-installation, storage, security and system diagnosis, and repair. Topics also include discussion of current and future technology industry trends.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITM 311
Introduction to Software Development
A broad introduction to object-oriented programming and the related knowledge necessary to program in a contemporary programming language. This would include coverage of an Application Development Kit, a standard integrated Development environment, and the use of GUI components.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITM 312
Introduction to Systems Software Programming
Introduces basic concepts of systems programming. Students learn to apply basic programming concepts toward solving problems, create source files and implement header files, work with and effectively use basic data types, abstract data types, control structures, code modularization and arrays. Students will be introduced to object paradigm including, classes, inheritance, and polymorphism applications.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITM 313
Introduction to Open Source Application Development
Introduces basic concepts of systems programming using a modern open source language. Students learn to apply basic programming concepts toward solving problems, writing pseudocode, working with and effectively using basic data types, abstract data types, control structures, code modularization and arrays. They will learn to detect errors, work with variables and loops, and discover how functions, methods, and operators work with different data types. Students will be introduced to the object paradigm including classes, inheritance , and polymorphism.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITM 497
Independent Study
Special projects.
Credit: Variable

ITM 498
Undergraduate Research Immersion: Team
This course provides a faculty-mentored immersive research experience as a part of a student team. Research topics are determined by faculty mentor's area of research.
Lecture: 0 **Lab:** 6 **Credits:** 3

Interprofessional Project (IPRO)

IPRO 100
Introduction to the Interprofessional Project
Introduction to the interprofessional project.
Lecture: 1 **Lab:** 6 **Credits:** 3

IPRO 397
IPRO I: Interprofessional by Design
The IPRO I course is an immersive, action-oriented, dynamic learning experience guided by a team of instructors from the fields of design, engineering, business, law, architecture, psychology, and social sciences. IPRO I introduces students to the interprofessional project concept and its underlying body of knowledge by: incorporating hands-on, small group, user-centered design projects informed by instructor-lead discussions and guest speakers; stimulating and facilitating project idea development that involves a collaborative innovation process; developing an understanding of the socio-economic context of themed clusters of workplace project possibilities (e.g., venture development, service learning, process improvement, sustainability, research); and forming the core of an IPRO II team and developing its project plan.
Lecture: 1 **Lab:** 6 **Credits:** 3
Satisfies: Communications (C)

IPRO 497
Interprofessional Project (IPRO)
Interprofessional projects allow students to learn teamwork, leadership and project management skills, while working in multidisciplinary teams on projects involving technical, ethical, environmental, economic, public policy, and legal issues. IPRO project teams are typically comprised of 10-12 students from sophomore through graduate level and from all disciplines that can contribute to a project. Every effort will be made to accommodate students' first choices; however, it may be necessary to balance students across all projects scheduled for the semester or to consolidate students into fewer projects to meet minimum team requirement. Specific rules about selection of IPRO projects may apply to certain degree programs. Some projects may carry Humanities or Social Science credit. Students are encouraged to consult the lead faculty member for the project and their faculty advisor before registering for a project.
Lecture: 1 **Lab:** 6 **Credits:** 3
Satisfies: Communications (C)

ITM Development (ITMD)

ITMD 321
Data Modeling and Applications
Basic data modeling concepts are introduced. Hands-on database design, implementation, and administration of single-user and shared multi-user database applications using a contemporary relational database management system.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 361
Fundamentals of Web Development
This course will cover the creation of Web pages and sites using HTML, CSS, Javascript, jQuery, and graphical applications as well as the client and server architecture of the Internet and related web technologies. The creation and deployment of modern, standards-compliant web pages are addressed. Students create and deploy a Web site with multiple pages and cross-linked structures.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 362
Human-Computer Interaction and Web Design
Students in this course will learn the importance of human-computer interaction design and the effectiveness of user-centered design. The course will cover a survey of methods frequently used by the HCI profession, such as usability testing and prototyping, as well as general design principles and how to use design guidelines. A particular emphasis will be placed on usability for Web site engineering, and students will apply knowledge from the field in the design and construction of user-centered Web sites.
Prerequisite(s): ITMD 361
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 411
Intermediate Software Development
This course covers a broad spectrum of object-oriented programming concepts and application programming interfaces. The student considers the details of object-orientated development in topics of multi-threading, data structure collections, stream I/O and client interfaces. Software engineering topics of packaging and deployment are covered as well. Hands-on exercises reinforce concepts taught throughout the course.
Prerequisite(s): (ITM 311 or CS 116 or CS 201) and (ITM 312 or ITM 313 or CS 331)
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 412
Advanced Structured and Systems Programming
Structured programming continues with advanced concepts including strings, arrays, pointers, data structures, file manipulation, and dynamic memory management. Students create more complex applications that work with user input, manipulate user supplied text or text obtained from a file, apply standard library routines for working with literal text, use pointers to store complex structures within arrays, and read and write data from files, the console, and the terminal. The object-oriented programming (OOP) paradigm is covered in depth including the philosophy of OOP, classes and objects, inheritance, template classes, and making use of class libraries.
Prerequisite(s): ITM 312
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 413
Open Source Programming
Contemporary open-source programming languages and frameworks are presented. The student considers design and development topics in system, graphical user interface, network, and web programming. Dynamic scripting languages are covered using object-oriented, concurrent, and functional programming paradigms. Concepts gained throughout the course are reinforced with numerous exercises which will culminate in an open-source programming project.
Prerequisite(s): ITMD 411
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 415
Advanced Software Development
This course considers Web container application development for enterprise systems. The primary focus is on database connectivity (JDBC) integration with Web application programming using an enterprise-level application framework. A Web application term project considers the design and implementation of a database instance that serves as the information tier in a contemporary 3-tier enterprise solution.
Prerequisite(s): ITMD 411
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 419
Topics in Software Development
This course will cover a particular topic in software development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMD 419/519 credit may be applied to a degree.
Credit: Variable

ITMD 422
Advanced Database Management
Advanced topics in database management and programming including client server application development are introduced. Expands knowledge of data modeling concepts and introduces object-oriented data modeling techniques. Students will learn the use of Structured Query Language in a variety of application and operating system environments.
Prerequisite(s): ITMD 421
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITMD 453
Enterprise Intelligent Device Applications
Intelligent device application development is covered with proprietary enterprise and open-source technologies on media device, mobile, and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on simulated and real "smart" devices including smart phones, tablets, sensors, actuators, drones, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application.
Prerequisite(s): ITM 311
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 454
Mass-Market Intelligent Device Applications
Intelligent device application development is covered with leading mass-market and open-source technologies on media device, mobile, and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on simulated and real "smart" devices including smart phones, tablets, sensors, actuators, drones, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application.
Prerequisite(s): ITM 312
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 455
Open-Source Intelligent Device Applications
Intelligent device application development is covered with various technologies on mobile and robotic platforms. Utilizing contemporary toolkits, the student considers design and development on emulated and real "smart" devices including smart phones, personal digital assistants, sensors, actuators, and robots. Numerous exercises reinforce concepts gained throughout the course. A term project will integrate course topics into a comprehensive intelligent device application.
Prerequisite(s): ITM 311
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 460
Fundamentals of Multimedia
Students are introduced to computer-based multimedia theory, concepts, and applications. Topics include desktop publishing, hypermedia, presentation graphics, graphic images, animation, sound, video, multimedia on the World Wide Web and integrated multimedia authoring techniques.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITMD 462
Web Site Application Development
This course is designed to primarily introduce PHP as a server-side programming language for building dynamic web pages and applications. Topics covered include PHP language syntax and usage, handling form data, current libraries and frameworks, web application security, development tools, application architecture, and database access. Other languages for server-side web development and the use of content management systems may be discussed. Students will design and create a web application that will allow for user login pages as well as functionality to create, read, update, and delete database content through a web interface using web forms and basic database structure.
Prerequisite(s): ITM 311 and ITMD 421 and ITMD 361
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITMD 463
Intermediate Web Application Development
In-depth examination of the concepts involved in the development of Internet applications. Students will learn the differences and similarities between Internet applications and traditional client/server applications. A discussion of the technologies involved in creating these Internet applications is included, and students will learn to use these technologies to create robust server-side applications.
Prerequisite(s): ITMD 361
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 464
Advanced Web Application Development
Strategies for management of electronic commerce allow students to learn to re-engineer established business processes to increase enterprise competitive advantage, provide better customer service, reduce operating costs, and achieve a better return on investment. Students will learn to evaluate, use, and deploy state-of-the-art tools and techniques needed to develop a reliable e-commerce offering on the Web. The course will cover state-of-the-art programming and development tools. This class will provide students with hands-on exposure needed to design and build a fully functional e-commerce Web site.
Prerequisite(s): ITMD 463
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 465
Rich Internet Applications
Students learn to create interactive rich Internet applications using modern web development technologies, frameworks, and techniques to deliver robust applications that primarily operate on the client-side. The emphasis will be on developing client-side programs that run in a standards-based web browser without plugins. Some server and command line coding will also be explored. Topics covered may include the JavaScript language, HTML5 APIs, the Document Object Model (DOM), JavaScript libraries and frameworks, development tools, application architecture, and compile-to-JS languages.
Prerequisite(s): ITMD 361 and ITM 311
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 466
Service-Oriented Architecture
This course covers IT enterprise systems employing web services technologies in SOA and ESB architectural patterns. The student considers SOA which defines and provisions IT infrastructure and allows for a loosely-coupled data exchange over disparate applications participating in business processes. The simplification of integration and flexible reuse of business components within SOA is greatly furthered by ESB. Lab exercises using contemporary tool-kits are utilized to reinforce platform-agnostic course topics.
Prerequisite(s): ITMD 411 and ITMD 361
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 467
Web Systems Integration
In this project-based course, student teams will build an enterprise-grade website and web infrastructure integrating server-side applications, databases, and client-side rich internet applications as a solution to a defined business problem.
Prerequisite(s): ITMD 465 and ITMD 462
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMD 469
Topics in Application Development
This course will cover a particular topic in application development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMD 469/569 credit may be applied to a degree.
Credit: Variable

ITM Management (ITMM)

ITMM 464
Social Media Marketing
Class participants will explore the tactics, tools, and strategies of incorporating new media channels to successfully grow a business and/or to maximize the goals of other types of organizations.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 470
Fundamentals of Management for Technology Professionals
This course explores fundamentals of management for professionals in high-technology fields. It addresses the challenges of the following: managing technical professionals and technology assets; human resource management; budgeting and managerial accounting; management of services, infrastructure, outsourcing, and vendor relationships; technology governance and strategy; and resource planning.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITMM 471
Project Management for Information Technology and Management
Basic principles of project management are taught with a particular focus on project planning for information technology hardware, software and networking project implementation. Management of application development and major Web development projects will also be addressed.
Prerequisite(s): ITM 100
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 481
Information Technology Entrepreneurship
This course prepares students to become leaders in information technology and to build ITM companies. Students design and develop a prototype ITM product and prepare a business plan and venture proposal presentation.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 482
Business Innovation
This course is designed to teach innovative thinking through theory, methods, and practice of innovation. The course incorporates Einstein's thinking, and Edison's method to establish the innovation process that can be applied in current business environment. Current economic conditions and global sourcing requires that innovation becomes a leading tool for developing a competitive edge. Innovation has been considered a competency of educated, design engineering, and a selected few employees that has become insufficient today. Corporations and organizations need innovation to develop customer-specific solutions in almost real time.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMM 485
Legal and Ethical Issues in Information Technology
Current legal issues in information technology are addressed including elements of contracting, payment systems and digital signatures, privacy concerns, intellectual property, business torts, and criminal liability including hacking, computer trespass and fraud. Examination of ethical issues including privacy, system abuse, and ethical practices in information technology equip students to make sound ethical choices and resolve legal and moral issues that arise in information technology.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITM Operations (ITMO)

ITMO 340
Introduction to Data Networks and the Internet
This course covers current and evolving data network technologies, protocols, network components, and the networks that use them, focusing on the Internet and related LANs. The state of worldwide networking and its evolution will be discussed. This course covers the Internet architecture, organization, and protocols including Ethernet, 802.11, routing, the TCP/UDP/IP suite, DNS, SNMP, DHCP, and more. Students will be presented with Internet-specific networking tools for searching, testing, debugging, and configuring networks and network-connected host computers. There will be opportunities for network configuration and hands-on use of tools.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 356
Introduction to Open Source Operating Systems
Students learn to set up and configure an industry-standard open source operating system including system installation and basic system administration; system architecture; package management; command-line commands; devices, filesystems, and the filesystem hierarchy standard. Also addressed are applications, shells, scripting and data management; user interfaces and desktops; administrative tasks; essential system services; networking fundamentals; and security, as well as support issues for open source software. Multiple distributions are covered with emphasis on the two leading major distribution forks.
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 417
Shell Scripting for System Administration
Focuses on preparation of shell scripts to enhance and streamline system administration tasks in all contemporary server operating systems. Scripting will be taught in both native and portable environments. The course will address shell programming, regular expressions, common and system-specific shell utilities and built-in commands, user defined and shell variables, flow control structures, shell functions, and the creation and execution of shell scripts. Homework and hands-on exercises will provide practical experience in contemporary server environments. Same as ITMO 517.
Prerequisite(s): ITMO 356 or ITMO 456
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 433
Enterprise Server Administration
Students learn to set up, maintain, and administer X86-based servers and associated networks using a contemporary industry-standard proprietary operating system. Topics include hardware requirements; software compatibility; system installation, configuration and options, and post-installation topics; administrative and technical practices required for system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention. Also addressed is configuration and administration of common network and server services such as DNS, DHCP, remote access, email, basic virtualization, web and web services, and more.
Prerequisite(s): ITM 301 and (ITMO 340 or ITMO 440)
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 441
Network Administration and Operations
Students learn the details, use, and configuration of network applications. Currently protocols and application technologies considered include SNMP, SMTP, IMAP, POP, MIME, BOOTP, DHCP, SAMBA, NFS, AFS, X, HTTP, DNS, NetBIOS, and CIFS/SMB. Windows workgroups and domains: file and printer sharing, remote access, and Windows networking are addressed. A research paper in the above topic areas is required.
Prerequisite(s): ITMO 340 or ITMO 540 with min. grade of C or ITMO 440
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 444
Cloud Computing Technologies
Computing applications hosted on dynamically-scaled virtual resources available as services are considered. Collaborative and non-collaborative "cloud-resident" applications are analyzed with respect to cost, device/location independence, scalability, reliability, security, and sustainability. Commercial and local cloud architectures are examined. A group-based integration of course topics will result in a project employing various cloud computing technologies.
Prerequisite(s): ITMD 421 or ITMD 321
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 446
Telecommunications Over Data Networks
This course covers a suite of application protocols known as Voice over IP (VoIP). It covers key protocols within that suite, including Session Initiation Protocol (SIP), Real-time Transport Protocol (RTP) and Session Description Protocol (SDP) as well as the architectures of various VoIP installations including on-net to on-net; on-net to PSTN; and inter-domain scenarios. The functions of the Network Elements in these architectures are defined and examples of products that include these network elements are examined. Contrast with circuit-switched and web-based communications systems is provided.
Prerequisite(s): ITMO 440 or ITMO 340
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMO 450
Enterprise End-User System Administration
Students learn to set up, configure, and maintain end-user desktop and portable computers and devices in an enterprise environment using a contemporary proprietary operating system, including the actual installation of the operating system in a networked client-server environment. User account management, security, printing, disk configuration, and backup procedures are addressed with particular attention to coverage of networked applications. System installation, configuration, and administration issues as well as network file systems, network access, and compatibility with other operating systems are also addressed. Administration of central server resources associated with management and provisioning of end-user systems in workgroups, domains, or forests is also addressed.
Prerequisite(s): ITM 301
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 453
Open Source Server Administration
Students learn the administration topics and concepts of IT orchestration, automation, monitoring, and metric collection. Topics include configuring industry standard automation tooling and using scripting to achieve immutable infrastructure. Students will learn how to monitor and collect and present metrics in regards to the infrastructure they deploy.
Prerequisite(s): (ITMO 340 or ITMO 440) and (ITMO 356 or ITMO 456)
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMO 454
Operating System Virtualization
This course will cover technologies allowing multiple instances of operating systems to be run on a single physical system. Concepts addressed will include hypervisors, virtual machines, paravirtualization and virtual appliances. Both server and desktop virtualization will be examined in detail, with brief coverage of storage virtualization and application virtualization. Business benefits, business cases and security implications of virtualization will be discussed. Extensive hands-on assignments and a group project will allow students to gain first-hand experience of this technology.
Prerequisite(s): ITM 301 or ITMO 456 or ITMO 356
Lecture: 2 **Lab:** 2 **Credits:** 3

ITM Security (ITMS)

ITMS 418
Coding Security
This course examines security architecture elements within modern object oriented programming languages that create the framework for secure programming. Analysis of components and services with their inherent strength and weaknesses give rise to common coding security challenges. An exploration of identity management, encryption services and common hacking techniques will enable the student's ability to develop secure code. Homework assignments and projects will reinforce theories taught.
Prerequisite(s): ITMD 411
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 428
Database Security
Students will engage in an in-depth examination of topics in data security including security considerations in applications and systems development, encryption methods, cryptography law and security architecture and models.
Prerequisite(s): ITMD 421
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 438
Cyber Forensics
This course will address methods to properly conduct a computer and/or network forensics investigation including digital evidence collection and evaluation and legal issues involved in network forensics. Technical issues in acquiring court admissible chains-of-evidence using various forensic tools that reconstruct criminally liable actions at the physical and logical levels are also addressed. Technical topics covered include detailed analysis of hard disks, files systems (including FAT, NTFS, and EXT) and removable storage media; mechanisms for hiding and detecting hidden information; and the hands-on use of powerful forensic analysis tools.
Prerequisite(s): ITMS 448 and ITMO 456
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 443
Vulnerability Analysis and Control
This course addresses hands-on ethical hacking, penetration testing, and detection of malicious probes and their prevention. It provides students with in-depth theoretical and practical knowledge of the vulnerabilities of networks of computers including the networks themselves, operating systems, and important applications. Integrated with the lectures are laboratories focusing on the use of open source and freeware tools; students will learn in a closed environment to probe, penetrate, and hack other networks.
Prerequisite(s): (ITMO 340 or ITMO 356) and (ITMO 440 or ITMO 456)
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 448
Cyber Security Technologies
Prepares students for a role as a network security analyst and administrator. Topics include viruses, worms, and other attack mechanisms, vulnerabilities, and countermeasures; network security protocols, encryption, identity and authentication, scanning, firewalls, security tools, and organizations addressing security. A component of this course is a self-contained team project that, if the student wishes, can be extended into a fully operational security system in a subsequent course.
Prerequisite(s): ITMO 340 or ITMO 540 with min. grade of C
Lecture: 2 **Lab:** 2 **Credits:** 3
Satisfies: Communications (C)

ITMS 458
Operating System Security
This course will address theoretical concepts of operating system security, security architectures of current operating systems, and details of security implementation using best practices to configure operating systems to industry security standards. Server configuration, system-level firewalls, file system security, logging, anti-virus and anti-spyware measures and other operating system security strategies will be examined.
Prerequisite(s): ITMO 456
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMS 478
Cyber Security Management
In-depth examination of topics in the management of information technology security including access control systems and methodology, business continuity and disaster recovery planning, legal issues in information system security, ethics, computer operations security, physical security and security architecture & models using current standards and models.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

ITMS 479
Topics in Information Security
This course will cover a particular topic in Information Security, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMS 479/579 credit may be applied to a degree.
Credit: Variable

ITMS 483
Digital Evidence
In this course, students learn the fundamental principles and concepts in the conduct of investigations in the digital realm. Students will learn the process and methods of obtaining, preserving and presenting digital information for use as evidence in civil, criminal, or administrative cases. Topics include legal concepts and terminology, ethics, computer crime, investigative procedures, chain of custody, digital evidence controls, processing crime and incident scenes, data acquisition, e-mail Investigations, applicable case law, and appearance as an expert witness in a judicial or administrative proceeding.
Prerequisite(s): ITMS 438
Lecture: 3 **Lab:** 0 **Credits:** 3

ITMS 484
Governance, Risk, and Compliance
This course is an in-depth examination of topics in information technology/information security governance, risk, and compliance including information assurance policies, standards, and compliance as well as the examination of security risk analysis and the performance of systems certification and accreditation.
Lecture: 3 **Lab:** 0 **Credits:** 3

ITM Theory and Technology (ITMT)

ITMT 430
System Integration
In this capstone course, students will identify, gather, analyze, and write requirements based on user needs and will then design, construct, integrate, and implement an information system as a solution to a business problem. Students will document integration requirements using business process models and will learn and apply key systems integration architecture, methodologies, and technologies using industry best practices. User needs and user centered design will be applied in the selection, creation, evaluation, and administration of the resulting system. The system design process will take into account professional, ethical, legal, security, and social issues and responsibilities and stress the local and global impact of computing on individuals, organizations, and society. Discussion will also cover the need to engage in continuing professional development.
Prerequisite(s): ITMD 411 and ITMD 321 and ITMM 471 and ITMO 356 and ITMD 362 and ITMO 340
Lecture: 2 **Lab:** 2 **Credits:** 3
Satisfies: Ethics (E)

ITMT 491
Undergraduate Research
Undergraduate research. Written consent of instructor is required.
Credit: Variable

ITMT 492
Introduction to Smart Technologies
This course covers reconfigurable intelligent devices programmed with modern high level languages focusing on design and integration to modern environments. The course will also cover the topic and deployment of wireless sensor networks and the use of rapid prototyping for commercial application. Students will discover hardware, software and firmware design trade-offs as well as best practices in current embedded systems development. A final project will integrate course topics into a system using an embeddable single-board microcontroller.
Prerequisite(s): ITM 311 or ITM 312
Lecture: 2 **Lab:** 2 **Credits:** 3

ITMT 495
Topics in Information Technology
This course will cover a particular topic varying from semester to semester in which there is particular student or staff interest.
Credit: Variable

Landscape Architecture (LA)

LA 497
Special Projects
Special projects.
Credit: Variable

Lewis College (UG-LCHS)

LCHS 100
Introduction to the Professions
This course is designed for students who are majors in the Departments of Psychology, Humanities, or Social Sciences. undecided about their major. or who are undecided about their major. Students will learn about professions in the context of different industries related to majors in those Departments, including entry points for each industry and the career opportunities associated with different sectors. Students will be provided assessments of their abilities and interests to inform their thinking about career paths that represent a best fit.
Lecture: 2 **Lab:** 0 **Credits:** 2
Satisfies: Communications (C)

LCHS 285
Special Topics
Investigate a topic of current interest at an introductory level. Topic will be announced by instructor at scheduling time. Course may be taken multiple times.
Lecture: 3 **Lab:** 0 **Credits:** 3

LCHS 286
Special Topics in the Human Sciences
This course investigates a topic in the human sciences.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

LCHS 360
Building Success: Career and Life Design in the 21st Century
Building Success: Career and Life Design in the 21st Century equips Illinois Tech students with the career and life tools to help them chart their future. The course will help students uncover insights into their strengths and values and provide them career resources and strategies to help them confidently answer the question "tell me about yourself." The curriculum is designed to help any student/any major with the career and life design process.
Lecture: 0 **Lab:** 0 **Credits:** 0

LCHS 397
Roosevelt Placeholder
Placeholder for courses taught at Roosevelt University.
Lecture: 3 **Lab:** 0 **Credits:** 3

Literature (LIT)

LIT 306
Science Fiction
A treatment of select science fiction texts in terms of how they reflect shifting forms of work and social life in the 20th century. The course will focus on how these texts translate shifts in social patterns and popular entertainment.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 307
Graphic Novel
Comics, once a genre associated primarily with superheroes, have evolved since the 1970's to address weighty philosophical and existential issues in extended formats such as the graphic novel. This course will examine the graphic novels from major authors in the genre (e.g., Spiegelman, Eisner, and Moore) as well as "outside" artists. Also covered are the theoretical foundations of comics theory according to Will Eisner and Scott McCloud (among others). May not be taken for credit by students who have completed LIT 380 Graphic Novel.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 309
Short Fiction
A formal and thematic analysis of a diverse selection of works of short fiction. The selection will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 315
The Novel
Analysis of the novel as a literary form with attention to its place in ongoing cultural and political discourse.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 326
World Literatures
Contemporary networks of global capital and information technologies provide the motivation for the reading strategies of this course. The course will examine literary texts from a variety of global contexts from the perspective of globalism and nationalism.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 328
Poetry
Study of poetry and imaginative prose, including an analysis of the theoretical, literary, and socio-cultural contexts of these works. The course may include creative writing by students.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 339
Shakespeare on Stage and Screen
While reading is the first step in understanding Shakespeare's work, seeing his words brought to life in a film or stage production comes closest to experiencing the plays as Shakespeare intended 400 years ago: as a performance. For each play discussed, students will view and compare two film versions. Students will also go to a live production of one play. Also covered are a history of Shakespeare in film and an introduction to film analysis. May not be taken for credit by students who have taken LIT 380 Shakespeare on Stage and Screen.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 341
Modern Drama
Study of major dramatists and movements in the theater since Ibsen and Strindberg, with special emphasis on such writers as Chekhov, Shaw, Brecht, O'Neill, Ionesco, and Pinter.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 342
Theater in Chicago
Designed to introduce students to the variety of professional theater performances in and around Chicago. Main emphasis on seeing plays, ancient to contemporary; essays and oral reports; study of dramatic genres and theater history.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 343
Film Analysis
Examination of the style and language of film as shown in a number of feature films, with emphasis on the various ways individual directors use the cinema for personal and cultural ends.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 352
Gender and Sexuality in Literature
This course introduces students to literary texts in Western and other traditions that examine issues of gender and sexuality, exploring how both gender and sexuality are interactive concepts shaped by their interrelationships with other vectors of identity, and with the artistic forms in which they are represented. May not be taken for credit by students who have taken LIT 380 Gender and Sexuality in Literature.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 353
Writing in Black
An examination of works by Toni Morrison, Paule Marshall, W.E.B. DuBois, Richard Wright and other black writers. The course includes formal and ideological analysis, emphasizing both nationalism and transnationalism in black culture. Prerequisite: A 100-level humanities course.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 354
African American Literature
This course explores various issues represented within African American literature. Throughout the course the students will read texts that focus on relationships between race, class, gender and identity. Students will discuss and research topics associated with themes outlined by the instructor.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 360
Chicago Literature
A survey of great American novelists, poets, and dramatists who have lived and worked in Chicago from the time of the Great Fire to the present day, and who have made Chicago one of the great world literary centers. Writers discussed include such figures as Theodore Dreisler, Carl Sandburg and Richard Wright. Prerequisite: A 100-level humanities course.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 366
Twentieth-Century American Literature
Study of such writers as Steineck, Frost, Eliot, Anderson, O'Neill, Hemingway, Cather, Wolfe, Faulkner, and contemporary writers such as Updike and Toni Morrison.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 380
Topics in Literature
An investigation into a topic of current or enduring interest in literature, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 411
Workshop in Creative Writing
A workshop demonstrating principles of composition in fiction, poetry, or drama, studied from a writer's vantage point. Works by modern authors are analyzed. Student manuscripts are discussed and evaluated.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

LIT 491
Independent Reading and Research
Consent of department. For advanced students.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Credit: Variable
Satisfies: Humanities (H)

LIT 497
Special Projects
Special project.
Credit: Variable
Satisfies: Communications (C), Humanities (H)

Materials Science (MS)

MS 201
Materials Science
The scientific principles determining the structure of metallic, polymeric, ceramic, semiconductor and composite materials; electronic structure, atomic bonding, atomic structure, microstructure and macrostructure. The basic principles of structure-property relationships in the context of chemical, mechanical and physical properties of materials.
Prerequisite(s): CHEM 124 or CHEM 122
Lecture: 3 **Lab:** 0 **Credits:** 3

Mathematics (MATH)

MATH 100
Introduction to the Profession
Introduces the student to the scope of mathematics as a profession, develops a sense of mathematical curiosity and problem solving skills, identifies and reinforces the student's career choices, and provides a mechanism for regular academic advising. Provides integration with other first-year courses. Introduces applications of mathematics to areas such as engineering, physics, computer science, and finance. Emphasis is placed on the development of teamwork skills.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 119
Geometry for Architects
Basic Euclidean and analytic geometry in two and three dimensions; trigonometry. Equations of lines, circles and conic sections; resolution of triangles; polar coordinates. Equations of planes, lines, quadratic surfaces. Applications. This course does not count toward business, computer science, engineering, mathematics, or natural science degree programs.
Lecture: 3 **Lab:** 1 **Credits:** 3

MATH 122
Introduction to Calculus
Basic concepts of calculus of a single variable; limits, continuity, derivatives, and integrals. Applications. This course does not count toward any business, computer science, engineering, mathematics, or natural science degree programs.
Prerequisite(s): MATH 119
Lecture: 3 **Lab:** 1 **Credits:** 3

MATH 130
Thinking Mathematically
This course allows students to discover, explore, and apply modern mathematical ideas. Emphasis is placed on using sound reasoning skills, visualizing mathematical concepts, and communicating mathematical ideas effectively. Classroom discussion and group work on challenging problems are central to the course. Topics from probability, statistics, logic, number theory, graph theory, combinatorics, chaos theory, the concept of infinity, and geometry may be included. This course does not count toward any computer science, engineering, mathematics, or natural science degree programs.
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 131
Mathematics for Sustainability
The course provides students with the mathematical background and quantitative reasoning skills necessary to engage as informed citizens in discussions of sustainability related to climate change, resources, pollution, recycling, economic change, and similar matters of public interest. Introduces mathematical modeling techniques with examples related to environmental and economic sustainability. Emphasis is placed on quantitative reasoning, visualization of mathematical concepts and effective communication, both verbally and textually, through writing projects that require quantitative evidence to support an argument, classroom activities, and group work. Topics range from probability, statistics, decision theory, graph theory, physics, modeling, and algebra.
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 148
Preparation for Calculus
Review of algebra and analytic geometry. Functions, limits, derivatives. Trigonometry, trigonometric functions and their derivatives. Inverse functions, inverse trigonometric functions and their derivatives. Exponential and logarithmic functions. This course does not count toward any mathematics requirements in business, computer science, engineering, mathematics, or natural science degree programs.
Lecture: 4 **Lab:** 0 **Credits:** 4

MATH 151
Calculus I
Analytic geometry. Functions and their graphs. Limits and continuity. Derivatives of algebraic and trigonometric functions. Applications of the derivative. Introduction to integrals and their applications.
Prerequisite(s): IIT Mathematics Placement score of 151 or MATH 145 with min. grade of C or MATH 148 with min. grade of C
Lecture: 4 **Lab:** 1 **Credits:** 5
Satisfies: Communications (C)

MATH 152
Calculus II
Transcendental functions and their calculus. Integration techniques. Applications of the integral. Indeterminate forms and improper integrals. Polar coordinates. Numerical series and power series expansions.
Prerequisite(s): MATH 149 with min. grade of C or MATH 151 with min. grade of C
Lecture: 4 **Lab:** 1 **Credits:** 5
Satisfies: Communications (C)

MATH 180
Fundamentals of Discrete Mathematics
Basic counting techniques, discrete probability, graph theory, algorithm complexity, logic and proofs, and other fundamental discrete topics. Required for students in the Bachelor of Information Technology and Management degree. This course does not count toward any computer science, engineering, mathematics, or natural science degree program. Credit will only be granted for one of MATH 180, MATH 230, and CS 330.
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 225
Introductory Statistics
An introduction to statistics; data collection, description, visualization and analysis; basic probability; statistical reasoning and inference including hypothesis tests and confidence intervals: t-tests, chi-squared tests, ANOVA, correlation and regression.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 230
Introduction to Discrete Math
Sets, statements, and elementary symbolic logic; relations and digraphs; functions and sequences; mathematical induction; basic counting techniques and recurrence. Credit will not be granted for both CS 330 and MATH 230.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 251
Multivariate and Vector Calculus
Analytic geometry in three-dimensional space. Partial derivatives. Multiple integrals. Vector analysis. Applications.
Prerequisite(s): MATH 152
Lecture: 4 **Lab:** 0 **Credits:** 4

MATH 252
Introduction to Differential Equations
Linear differential equations of order one. Linear differential equations of higher order. Series solutions of linear DE. Laplace transforms and their use in solving linear DE. Introduction to matrices. Systems of linear differential equations.
Prerequisite(s): MATH 152
Lecture: 4 **Lab:** 0 **Credits:** 4

MATH 332
Elementary Linear Algebra
Systems of linear equations; matrix algebra, inverses, determinants, eigenvalues, and eigenvectors, diagonalization; vector spaces, basis, dimension, rank and nullity; inner product spaces, orthonormal bases; quadratic forms.
Prerequisite(s): MATH 251*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 333
Matrix Algebra and Complex Variables
Vectors and matrices; matrix operations, transpose, rank, inverse; determinants; solution of linear systems; eigenvalues and eigenvectors. The complex plane; analytic functions; contour integrals; Laurent series expansions; singularities and residues.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 350
Introduction to Computational Mathematics
Study and design of mathematical models for the numerical solution of scientific problems. This includes numerical methods for the solution on linear and nonlinear systems, basic data fitting problems, and ordinary differential equations. Robustness, accuracy, and speed of convergence of algorithms will be investigated including the basics of computer arithmetic and round-off errors. Same as MMAE 350.
Prerequisite(s): (CS 104 or CS 105 or CS 115) and MATH 251 and MATH 252*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 374
Probability and Statistics for Electrical and Computer Engineers
This course focuses on the introductory treatment of probability theory including: axioms of probability, discrete and continuous random variables, random vectors, marginal, joint, conditional and cumulative probability distributions, moment generating functions, expectations, and correlations. Also covered are sums of random variables, central limit theorem, sample means, and parameter estimation. Furthermore, random processes and random signals are covered. Examples and applications are drawn from problems of importance to electrical and computer engineers. Credit only granted for one of MATH 374, MATH 474, and MATH 475.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 380
Introduction to Mathematical Modeling
This course provides an introduction to problem-driven (as opposed to method-driven) applications of mathematics with a focus on design and analysis of models using tools from all parts of mathematics.
Prerequisite(s): (CS 104 or CS 105 or CS 115) and MATH 251 and MATH 252* and MATH 332, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 400
Real Analysis
Real numbers, continuous functions; differentiation and Riemann integration. Functions defined by series.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 402
Complex Analysis
Analytic functions, conformal mapping, contour integration, series expansions, singularities and residues, and applications. Intended as a first course in the subject for students in the physical sciences and engineering.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 405
Introduction to Iteration and Chaos
Functional iteration and orbits, periodic points and Sharkovsky's cycle theorem, chaos and dynamical systems of dimensions one and two. Julia sets and fractals, physical implications.
Prerequisite(s): (MATH 251 and MATH 252 and MATH 332) or (MATH 252 and MATH 333 and MATH 251)
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 410
Number Theory
Divisibility, congruencies, distribution of prime numbers, functions of number theory, diophantine equations, applications to encryption methods.
Prerequisite(s): MATH 230
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 420
Geometry
The course is focused on selected topics related to fundamental ideas and methods of Euclidean geometry, non-Euclidean geometry, and differential geometry in two and three dimensions and their applications with emphasis on various problem-solving strategies, geometric proof, visualization, and interrelation of different areas of mathematics. Permission of the instructor is required.
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 425
Statistical Methods
Concepts and methods of gathering, describing and analyzing data including basic statistical reasoning, basic probability, sampling, hypothesis testing, confidence intervals, correlation, regression, forecasting, and nonparametric statistics. No knowledge of calculus is assumed. This course is useful for students in education or the social sciences. This course does not count for graduation in any mathematics programs. Credit not given for both MATH 425 and MATH 476.
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 426
Statistical Tools for Engineers
Descriptive statistics and graphs, probability distributions, random sampling, independence, significance tests, design of experiments, regression, time-series analysis, statistical process control, introduction to multivariate analysis. Same as CHE 426. Credit not given for both Math 426 and CHE 426.
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 430
Applied Algebra
Introduction to groups, homomorphisms, group actions, rings, field theory. Applications, including constructions with ruler and compass, solvability by radicals, error correcting codes.
Prerequisite(s): MATH 230 or MATH 332*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 431
Computational Algebraic Geometry
Systems of polynomial equations and ideals in polynomial rings; solution sets of systems of equations and algebraic varieties in affine n-space; effective manipulation of ideals and varieties, algorithms for basic algebraic computations; Groebner bases; applications. Credit may not be granted for both MATH 431 and MATH 530.
Prerequisite(s): MATH 332 and MATH 230
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 435
Linear Optimization
Introduction to both theoretical and algorithmic aspects of linear optimization: geometry of linear programs, simplex method, anticycling, duality theory and dual simplex method, sensitivity analysis, large scale optimization via Dantzig-Wolfe decomposition and Benders decomposition, interior point methods, network flow problems, integer programming. Credit may not be granted for both MATH 435 and MATH 535.
Prerequisite(s): MATH 332
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 446
Introduction to Time Series
This course introduces the basic time series analysis and forecasting methods. Topics include stationary processes, ARMA models, spectral analysis, model and forecasting using ARMA models, nonstationary and seasonal time series models, multivariate time series, state-space models, and forecasting techniques.
Prerequisite(s): MATH 475 with min. grade of C or ECE 511 with min. grade of C
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 453
Combinatorics
Permutations and combinations; pigeonhole principle; inclusion-exclusion principle; recurrence relations and generating functions; enumeration under group action.
Prerequisite(s): MATH 230
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 454
Graph Theory and Applications
Directed and undirected graphs; paths, cycles, trees, Eulerian cycles, matchings and coverings, connectivity, Menger's Theorem, network flow, coloring, planarity, with applications to the sciences (computer, life, physical, social) and engineering.
Prerequisite(s): (MATH 230 and MATH 251) or (MATH 252 and MATH 230)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 461
Fourier Series and Boundary-Value Problems
Fourier series and integrals. The Laplace, heat, and wave equations: Solutions by separation of variables. D'Alembert's solution of the wave equation. Boundary-value problems.
Prerequisite(s): MATH 251 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 474
Probability and Statistics
Elementary probability theory including discrete and continuous distributions, sampling, estimation, confidence intervals, hypothesis testing, and linear regression. Credit not granted for both MATH 474 and MATH 475.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 475
Probability
Elementary probability theory; combinatorics; random variables; discrete and continuous distributions; joint distributions and moments; transformations and convolution; basic theorems; simulation. Credit not granted for both MATH 474 and MATH 475.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 476
Statistics
Estimation theory; hypothesis tests; confidence intervals; goodness-of-fit tests; correlation and linear regression; analysis of variance; nonparametric methods.
Prerequisite(s): MATH 475
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 477
Numerical Linear Algebra
Fundamentals of matrix theory; least squares problems; computer arithmetic; conditioning and stability; direct and iterative methods for linear systems; eigenvalue problems. Credit may not be granted for both MATH 477 and MATH 577.
Prerequisite(s): MATH 350 or MMAE 350
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 478
Numerical Methods for Differential Equations
Polynomial interpolation; numerical integration; numerical solution of initial value problems for ordinary differential equations by single and multi-step methods, Runge-Kutta, Predictor-Corrector; numerical solution of boundary value problems for ordinary differential equations by shooting method, finite differences and spectral methods. Credit may not be granted for both MATH 478 and MATH 578.
Prerequisite(s): MATH 350 or MMAE 350
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 481
Introduction to Stochastic Processes
This is an introductory, undergraduate course in stochastic processes. Its purpose is to introduce students to a range of stochastic processes which are used as modeling tools in diverse fields of applications, especially in risk management applications for finance and insurance. The course covers basic classes of stochastic processes: Markov chains and martingales in discrete time; Brownian motion; and Poisson process. It also presents some aspects of stochastic calculus.
Prerequisite(s): (MATH 332 and MATH 475) or (MATH 475 and MATH 333)
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 483
Design and Analysis of Experiments
Review of elementary probability and statistics; analysis of variance for design of experiments; estimation of parameters; confidence intervals for various linear combinations of the parameters; selection of sample sizes; various plots of residuals; block designs; Latin squares; one, two, and 2^k factorial designs; nested and cross factor designs; regression; nonparametric techniques.
Prerequisite(s): MATH 476
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 484
Regression
This course introduces the basic statistical regression model and design of experiments concepts. Topics include simple linear regression, multiple linear regression, least square estimates of parameters; hypothesis testing and confidence intervals in linear regression, testing of models, data analysis and appropriateness of models, generalized linear models, design and analysis of single-factor experiments.
Prerequisite(s): MATH 474 with min. grade of C or (MATH 476 with min. grade of C and MATH 475 with min. grade of C)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 485
Introduction to Mathematical Finance
This is an introductory course in mathematical finance. Technical difficulty of the subject is kept at a minimum while the major ideas and concepts underlying modern mathematical finance and financial engineering are explained and illustrated. The course covers the binomial model for stock prices and touches on continuous time models and the Black-Scholes formula.
Prerequisite(s): MATH 475
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 486
Mathematical Modeling I
The course provides a systematic approach to modeling applications from areas such as physics and chemistry, engineering, biology, and business (operations research). The mathematical models lead to discrete or continuous processes that may be deterministic or stochastic. Dimensional analysis and scaling are introduced to prepare a model for study. Analytic and computational tools from a broad range of applied mathematics will be used to obtain information about the models. The mathematical results will be compared to physical data to assess the usefulness of the models. Credit may not be granted for both MATH 486 and MATH 522.
Prerequisite(s): MATH 251 and MATH 332 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MATH 487
Mathematical Modeling II
The formulation of mathematical models, solution of mathematical equations, interpretation of results. Selected topics from queuing theory and financial derivatives.
Prerequisite(s): MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 488
Ordinary Differential Equations and Dynamical Systems
Boundary-value problems and Sturm-Liouville theory; linear system theory via eigenvalues and eigenvectors; Floquet theory; nonlinear systems: critical points, linearization, stability concepts, index theory, phase portrait analysis, limit cycles, and stable and unstable manifolds; bifurcation; and chaotic dynamics.
Prerequisite(s): MATH 252 and MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 489
Partial Differential Equations
First-order equations, characteristics. Classification of second-order equations. Laplace's equation; potential theory. Green's function, maximum principles. The wave equation: characteristics, general solution. The heat equation: use of integral transforms.
Prerequisite(s): MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

MATH 491
Reading and Research
Independent reading and research. **Instructor permission required.**
Credit: Variable
Satisfies: Communications (C)

MATH 497
Special Problems
Special problems.
Credit: Variable
Satisfies: Communications (C)

Mathematics and Science Educ (MSED)

MSED 200
Analysis of Classrooms
This is an introductory course providing students background in learning theory, motivation theory, classroom management, aspects of effective teaching, critical classroom variables, and the school as a system. This course includes a two-hour weekly seminar along with a practicum experience of five hours per week in an area school.
Lecture: 2 **Lab:** 5 **Credits:** 3
Satisfies: Communications (C)

MSED 250
Middle and Secondary Curriculum/Foundations
This course focuses on history/sociology of education, rationales, and goals of current reform efforts, curriculum design, development, and curriculum analysis. This course is designed to develop the participant's understanding of mathematics and science curricula in middle and secondary schools. Studies will include the roles of goals, standards, and learning theories in the development and selection of instructional materials, assessments, and technology. The course includes consideration of issues of equity and student diversity on middle and secondary school curricula. The course will involve readings, reflections, curriculum development, and evaluation projects.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MSED 300
Instructional Methods/Strategies I
Discussion/laboratory oriented course that focuses on instructional planning, implementation considerations of various teaching methods, and development of instructional activities. Students are also provided with opportunities to practice instructional skills in peer teaching lessons.
Prerequisite(s): (MSED 200 and MSED 250) or (MSED 500 and MSED 554) or (MSED 500 and MSED 555)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MSED 320
Inquiry and Problem Solving in Mathematics and Science
This course provides students with opportunities for reflection on aspects of inquiry and problem solving and nature of science and mathematics. It provides background for student development of instructional materials focusing on inquiry/problem solving, nature of science/mathematics, and how to modify and differentiate instructional materials to include the participation of all students. Must have received a passing score on the ISBE Basic Skills Exam.
Prerequisite(s): (MSED 200 and MSED 250) or (MSED 500 and MSED 554) or (MSED 500 and MSED 555)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MSED 350
Advanced Methods for Inclusive Instruction and Practicum
This course will help students develop an understanding of the roles community resources and informal settings can play in math/science achievement and the ability to create instructional materials that capitalize on the use of these resources to better design instructional materials and experiences to meet the diverse needs of their students. Students spend approximately five hours per week in an informal education venue (e.g., museum, aquarium, zoo) along with a weekly two-hour, on-campus course per week. Students will reflect on how their students can learn in informal settings, teaching to public student audiences and designing curricular materials. Assessments will include the development of a curriculum unit that includes formal and informal lessons.
Prerequisite(s): (MSED 200 and MSED 250 and MSED 300) or (MSED 300 and MSED 500 and MSED 554) or (MSED 300 and MSED 500 and MSED 555)
Lecture: 2 **Lab:** 5 **Credits:** 3
Satisfies: Communications (C)

MSED 400
Instructional Methods/Strategies II
Follow-up course to Instructional Methods/Strategies I with a strong focus in various advanced instructional models such as inductive, deductive, problem solving, and inquiry role development as well as cooperative learning and assessment. The course will emphasize the development, implementation, and assessment of differentiated instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all aspects of intellectual, social, and emotional development of all students regardless of cultural, social, and ethnic background. Students will have several opportunities to practice instructional models in peer teaching lessons.
Prerequisite(s): MSED 300
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MSED 450
Professional Internship
Capstone experience in which students assume continuous teaching responsibilities in at least three classes in an area school. Students will spend a full semester in the area school under the supervision of a classroom teacher and university supervisor. Students must have received a passing score of the ISBE Content Exam and faculty approval.
Prerequisite(s): MSED 300 and (MSED 320 or MSED 538) and (MSED 350 or MSED 540) and MSED 400
Lecture: 0 **Lab:** 40 **Credits:** 6
Satisfies: Communications (C)

MSED 480
Adolescent Psychology
This course is designed to develop the participants' understanding of adolescent psychology. The main foci throughout the course are the unique aspects of adolescents and how those aspects influence behavior, learning, and social interactions, especially with regard to middle schools. Studies will include educational psychology theories and models, motivation and learning, developmental changes during adolescence, cognitive abilities, human ecology, diversity, and cultures. Additionally, participants will examine historical and philosophical perspectives of adolescent psychology and synthesize how these perspectives have influenced teaching, learning, and cultures in middle schools. The course will involve weekly readings and reflections, classroom experiences, short assignments, tests/quizzes, research projects, and formal class presentations. Mandatory for students seeking middle school optional endorsements.
Lecture: 3 **Lab:** 0 **Credits:** 3

MSED 497
Special Projects
Special projects.
Credit: Variable

Mechl, Mtrls and Arspc Engrg (MMAE)

MMAE 100
Introduction to the Profession
Introduces the student to the scope of the engineering profession and its role in society, develops a sense of professionalism in the student, confirms and reinforces the student's career choices, and provides a mechanism for regular academic advising. Provides integration with other first-year courses. Applications of mathematics to engineering. Emphasis is placed on the development of professional communications and teamwork skills.
Lecture: 2 **Lab:** 1 **Credits:** 3
Satisfies: Communications (C)

MMAE 200
Statics
Equilibrium concepts. Free body diagrams. Statics of particles and rigid bodies. Distributed forces, centroids, center of gravity, hydrostatic loads, and moments of inertia. Analysis of trusses and frames. Friction including wedges, screws, and belts. Internal loads in beams.
Prerequisite(s): (CS 104* or CS 105* or CS 115*) and MATH 152* and PHYS 123, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 202
Mechanics of Solids
Stress and strain relations, mechanical properties. Axially loaded members. Torsion of circular shafts. Elementary bending theory, unsymmetric bending, normal and shear stresses in beams, beam deflection. Combined loading. Plane stress and strain, Mohr's circle, stress transformation.
Prerequisite(s): MMAE 200
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 232
Design for Innovation
Design and development of mechanical systems. The design process, isometric sketching, engineering drawings, CAD, sustainable design, whole-system design and lifecycle thinking, design for product lifetime, lightweighting, technical writing, bio-inspired design process, mechanism and linkage design, actuators, and engineering and law. Team-based design and build projects focusing on sustainable design techniques, bio-inspired locomotion, and mechatronics.
Prerequisite(s): (CS 104 or CS 105 or CS 115) and MMAE 200*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 1 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

MMAE 302
Advanced Mechanics of Solids
Analysis of stress and strain. Singularity functions. Plasticity under torsional and bending loads. Energy methods and Castigliano's theorems. Curved beams and springs. Pressure vessels. Stability of columns. Stress concentration and stress intensity factors. Theories of failure, yield, and fracture. Fatigue.
Prerequisite(s): MMAE 202 and MATH 252 and MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 304
Mechanics of Aerostructures
Loads on aircraft, and flight envelope. Stress, strain and constitutive relations. Torsion of open, closed and multi-cell tubes. Energy methods. Castigliano's theorems. Structural instability.
Prerequisite(s): MMAE 202 and MATH 252 and MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 305
Dynamics
Kinematics of particles. Kinetics of particles. Newton's laws of motion, energy; momentum. Systems of particles. Kinematics of rigid bodies. Plane motion of rigid bodies: forces and accelerations, energy, momentum.
Prerequisite(s): MATH 252* and (MMAE 200 or CAE 286), An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 311
Compressible Flow
Regimes of compressible perfect-gas flow. Steady, quasi one-dimensional flow in passages. Effects of heat addition and friction in ducts. Design of nozzles, diffusers and wind tunnels. Simple waves and shocks in unsteady duct flow. Steady two-dimensional supersonic flow including oblique shocks and Prandtl-Meyer expansions.
Prerequisite(s): MMAE 320 and MMAE 313
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 312
Aerodynamics of Aerospace Vehicles
Analysis of aerodynamic lift and drag forces on bodies. Potential flow calculation of lift on two-dimensional bodies; numerical solutions; source and vortex panels. Boundary layers and drag calculations. Aerodynamic characteristics of airfoils; the finite wing.
Prerequisite(s): MMAE 320 and MMAE 313 and MMAE 311*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 313
Fluid Mechanics
Basic properties of fluids in motion. Langrangian and Eulerian viewpoints, materials derivative, streamlines, etc. Continuity, energy, and linear and angular momentum equations in integral and differential forms. Integration of equations for one-dimensional forms and application to problems. Incompressible viscous flow; Navier-Stokes equations, parallel flow, pipe flow, and the Moody diagram. Introduction to laminar and turbulent boundary layers and free surface flows.
Prerequisite(s): MMAE 200 and MATH 252* and MATH 251 and MMAE 320*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 315
Aerospace Laboratory I
Basic skills for engineering research are taught, which include: analog electronic circuit analysis, fundamentals of digital data acquisition, measurements of pressure, temperature, flow rate, heat transfer, and static forces and moments; statistical data analysis.
Prerequisite(s): PHYS 221 and MMAE 350* and MMAE 311* and MMAE 313, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

MMAE 319
Mechanical Laboratory I
Basic skills for engineering research are taught, which include: analog electronic circuit analysis; fundamentals of digital data acquisition; measurements of pressure, temperature, flow rate, heat transfer, and static forces and moments; and statistical date analysis.
Prerequisite(s): MMAE 313 and MMAE 323* and PHYS 221, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

MMAE 320
Thermodynamics
Introduction to thermodynamics including properties of matter; First Law of Thermodynamics and its use in analyzing open and closed systems; limitations of the Second Law of Thermodynamics; entropy.
Prerequisite(s): MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 321
Applied Thermodynamics
Analysis of thermodynamic systems including energy analysis; analysis and design of power and refrigeration cycles; gas mixtures and chemically reacting systems; chemical equilibrium; combustion and fuel cells.
Prerequisite(s): MMAE 320 and MMAE 313*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 323
Heat and Mass Transfer
Basic laws of transport phenomena, including: steady-state heat conduction; multi-dimensional and transient conduction; forced internal and external convection; natural convection; heat exchanger design and analysis; fundamental concepts of radiation; shape factors and network analysis; diffusive and convective mass transfer; phase change, condensation and boiling.
Prerequisite(s): MMAE 320 and MMAE 313
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 332
Design of Machine Elements
Students will gain an understanding of the analysis of basic elements used in machine design. These include the characteristics of gears, gear trains, bearings, shafts, keys, mechanical springs, brakes and clutches, and flexible elements.
Prerequisite(s): (MMAE 302 or MMAE 304) and MMAE 232*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 350
Computational Mechanics
Explores the use of numerical methods to solve engineering problems in solid mechanics, fluid mechanics and heat transfer. Topics include matrix algebra, nonlinear equations of one variable, systems of linear algebraic equations, nonlinear equations of several variables, classification of partial differential equations in engineering, the finite difference method, and the finite element method. Same a MATH 350.
Prerequisite(s): MATH 251 and CS 104-201 and MMAE 202* and MATH 252*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 352
Aerospace Propulsion
Analysis and performance of various jet and rocket propulsive devices. Foundations of propulsion theory. Design and analysis of inlets, compressors, combustion chambers, and other elements of propulsive devices. Emphasis is placed on mobile power plants for aerospace applications.
Prerequisite(s): MMAE 311
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 362
Physics of Solids
Introduction of crystallography, crystal structure, crystal systems, symmetry, stereographic representation. Crystal structures in materials. X-ray diffraction; character of X-rays and their interaction with crystals; diffraction methods. Structure of the atom and the behavior of electrons in solids. Band theory of solids. Electrical, thermal and magnetic behavior. Theory of phase stability in alloys. Equivalent to PHYS 437.
Prerequisite(s): MS 201
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 365
Structure and Properties of Materials I
Crystal structures and structure determination. Crystal defects, intrinsic and extrinsic properties, diffusion, kinetics of transformations, evolution and classification of microstructures.
Prerequisite(s): MMAE 320* and MS 201, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 370
Materials Laboratory I
Introduction to materials characterization techniques including specimen preparation, metallography, optical and scanning electron microscopy, temperature measurement, data acquisition analysis and presentation.
Prerequisite(s): MMAE 365* or MMAE 371*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 1 **Lab:** 6 **Credits:** 3

MMAE 372
Aerospace Materials Lab
Mechanical behavior and microstructural characterization of aerospace materials including advanced metal alloys, polymers, ceramics, and composites. Introduction to mechanical testing techniques for assessing the properties and performance of aerospace materials. Evaluation of structural performance in terms of materials selection, processing, service conditions, and design.
Prerequisite(s): MMAE 202 and MS 201
Lecture: 3 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

MMAE 373
Instrumentation and Measurements Laboratory
Basic skills for engineering research are taught, which include: analog electronic circuit analysis, fundamentals of digital data acquisition and statistical data analysis. Laboratory testing methods including solid mechanics: tension, torsion, hardness, impact, toughness, fatigue and creep. Design of experiments.
Prerequisite(s): PHYS 221
Lecture: 2 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

MMAE 410
Aircraft Flight Mechanics
Airplane performance: takeoff, rate of climb, time to climb, ceilings, range and endurance, operating limitations, descent and landing. Helicopters and V/STOL aircraft. Airplane static stability and control: longitudinal stability, directional stability, and roll stability. Airplane equations of motion: kinematics and dynamics of airplanes, and stability derivatives. Dynamic response: longitudinal modes of motion, lateral modes of motion. Introduction to aircraft control.
Prerequisite(s): MMAE 443* and MMAE 312, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 411
Spacecraft Dynamics
Orbital mechanics: two-body problem, Kepler's equation, classical orbital elements, introduction to orbit perturbations. Mission analysis: orbital maneuvers, earth orbiting and interplanetary missions. Spacecraft attitude dynamics: three-dimensional kinematics of rigid bodies, Euler angles, equations of motion. Attitude stability and control: spin stabilization, momentum wheels and gyros, gravity gradient stabilization.
Prerequisite(s): MMAE 443* and MMAE 305 and MATH 252, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 412
Spacecraft Design I
Spacecraft systems design including real world mission analysis and orbit design, system engineering, launch vehicle requirements, attitude determination and control, propulsion, structural design, power systems thermal management, and telecommunications. Semester-long project is focused on the integration of multiple systems into a coherent spacecraft system to achieve specific mission requirements.(1-6-3)
Prerequisite(s): MMAE 411
Lecture: 2 **Lab:** 1 **Credits:** 3
Satisfies: Communications (C)

MMAE 414
Aircraft Design I
Aircraft design including aerodynamic, structural, and power plant characteristics to achieve performance goals. Focus on applications ranging from commercial to military and from manpowered to high-speed to long-duration aircraft. Semester project is a collaborative effort in which small design groups complete the preliminary design cycle of an aircraft to achieve specific design requirements.
Prerequisite(s): (MMAE 302 or MMAE 304) and MMAE 312 and MMAE 410* and MMAE 352, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 1 **Credits:** 3
Satisfies: Communications (C)

MMAE 415
Aerospace Laboratory II
Advanced skills for engineering research are taught, which include experiments with digital electronic circuit analysis, dynamic data acquisition techniques, fundamentals of fluid power system design, GPS and inertial guidance systems, air-breathing propulsion, and fly-by-wire control.
Prerequisite(s): (MMAE 315 or MMAE 319) and MMAE 443*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

MMAE 418
Fluid Power for Aerospace Applications
Basic principles and concepts needed for the design and troubleshooting of fluid power systems. An emphasis is placed on flight control and simulation of hydraulic systems and is extended to mobile and industrial applications.
Prerequisite(s): MMAE 313 and MMAE 443*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 2 **Lab:** 3 **Credits:** 3

MMAE 419
Mechanical Laboratory II
Mechanical Laboratory II Laboratory testing methods in the areas of solid mechanics and control of dynamical systems: tension, torsion, bending, hardness, Charpy impact, fracture toughness, fatigue, stress measurement with strain gages and P, PD, PID control. Design of experiments.
Prerequisite(s): MMAE 443*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

MMAE 425
Direct Energy Conversion
A study of various methods available for direct conversion of thermal energy into electrical energy. Introduction to the principles of operation of magneto-hydrodynamic generators, thermoelectric devices, thermionic converters, fuel cells and solar cells.
Prerequisite(s): MMAE 321 and PHYS 224
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 426
Nuclear, Fossil-Fuel, and Sustainable Energy Systems
Principles, technology, and hardware used for conversion of nuclear, fossil-fuel, and sustainable energy into electric power will be discussed. Thermodynamic analysis -- Rankine cycle. Design and key components of fossil-fuel power plants. Nuclear fuel, reactions, materials. Pressurized water reactors (PWR). Boiling water reactors (BWR). Canadian heavy water (CANDU) power plants. Heat transfer from the nuclear fuel elements. Introduction to two phase flow: flow regimes; models. Critical heat flux. Environmental effects of coal and nuclear power. Design of solar collectors. Direct conversion of solar energy into electricity. Wind power. Geothermal energy. Energy conservation and sustainable buildings. Enrichment of nuclear fuel. Nuclear weapons and effects of the explosions.
Prerequisite(s): MMAE 323 or CHE 302
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 432
Design of Mechanical Systems
Capstone design courses taken during the senior year. At the end of this course, students should have a good grasp of the design process and how to integrate design with the analysis taught in previous courses. The course serves as a guide to transferring the skills that the students learned in the classroom into becoming an engineer in industry or a graduate student in the field. The focus of the class will be a team-based project conceptualized and developed by the students.
Prerequisite(s): MMAE 332
Lecture: 1 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

MMAE 433
Design of Thermal Systems
Application of principles of fluid mechanics, heat transfer, and thermodynamics to design of components of engineering systems. Examples are drawn from power generation, environmental control, air and ground transportation, and industrial processes, as well as other industries. Groups of students work on projects for integration of these components and design of thermal systems.
Prerequisite(s): MMAE 321 and MMAE 323
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

MMAE 440
Introduction to Robotics
Classification of robots; kinematics and inverse kinematics of manipulators; trajectory planning; robot dynamics and equations of motion; position control.
Prerequisite(s): MMAE 305 and (MMAE 315 or MMAE 319)
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 441
Spacecraft and Aircraft Dynamics
Kinematics and dynamics of particles, systems of particles, and rigid bodies; translating and rotating reference frames; Euler angles. Aircraft longitudinal and lateral static stability; aircraft equations of motion. Spacecraft orbital dynamics; two-body problem classical orbital elements; orbital maneuvers.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 443
Systems Analysis and Control
Mathematical modeling of dynamic systems; linearization. Laplace transform; transfer functions; transient and steady-state response. Feedback control of single-input, single-output systems. Routh stability criterion. Root-locus method for control system design. Frequency-response methods; Bode plots; Nyquist stability criterion.
Prerequisite(s): MMAE 305 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 444
Design for Manufacture
The materials/design/manufacturing interface in the production of industrial and consumer goods. Material and process selection; process capabilities; modern trends in manufacturing. Life cycle engineering; competitive aspects of manufacturing; quality, cost, and environmental considerations.
Prerequisite(s): MMAE 485
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 445
Computer-Aided Design
Principles of geometric modeling, finite element analysis and design optimization. Curve, surface, and solid modeling. Mesh generation, Galerkin method, and Isoparametric elements. Optimum design concepts. Numerical methods for constrained and unconstrained optimization. Applications of CAD/CAE software for mechanical design problems.
Prerequisite(s): MMAE 350 and (MMAE 304 or MMAE 332)
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 450
Computational Mechanics II
Explores the use of numerical methods to solve engineering problems in continuum mechanics, fluid mechanics, and heat transfer. Topics include partial differential equations and differential and integral eigenvalue problems. As tools for the solution of such equations, we discuss methods of linear algebra, finite difference and finite volume methods, spectral methods, and finite element methods. The course contains an introduction to the use of a commercial finite element package for the solution of complex partial differential equations.
Prerequisite(s): MMAE 350 or MATH 350
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 451
Finite Element Methods in Engineering
Principles of minimum potential energy of structures--stiffness matrices, stress matrices and assembly process of global matrices. The finite element method for two-dimensional problems: interpolation functions, area coordinates, isoperimetric elements, and problems of stress concentration. General finite element codes: data generation and checks, ill-conditioned problems, and node numbering.
Prerequisite(s): MMAE 202 and MATH 252 and MMAE 350
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 453
Advanced Automotive Powertrains
This course provides insight into the various methods of propulsion available for automobiles. Students will receive the tools and practical understanding required to analyze a variety of vehicle powertrain architectures and predict the energy consumptions and vehicle performance of the current automotive powertrains. This course will provide students with an understanding of the working principles of internal combustion engines, hybrid powertrains, and electric vehicles; the ability to predict the energy requirements of these powertrains; experience in analyzing system and component efficiency based on vehicle test data; and a comprehensive view of the current challenges in the automotive transportation sector. Students will apply the analytical tools presented in the course to examine topics such as vehicle loads and losses, emissions control, vehicle efficiency, and the impact of vehicle hybridization and electrification.
Prerequisite(s): MMAE 321
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 461
Failure Analysis
This course provides comprehensive coverage of both the "how" and "why" of metal and ceramic failures and gives students the intellectual tools and practical understanding needed to analyze failures from a structural point of view. Its proven methods of examination and analysis enable students to reach correct, fact-based conclusions on the causes of metal failures, present and defend these conclusions before highly critical bodies, and suggest design improvements that may prevent future failures. Analytical methods presented in the course include stress analysis, fracture mechanics, fatigue analysis, corrosion science, and nondestructive testing. Numerous case studies illustrate the application of basic principles of metallurgy and failure analysis to a wide variety of real-world situations.
Prerequisite(s): MS 201
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 463
Structure and Properties of Materials II
Continuation of MMAE 365. Solidification structures, diffusional and diffusionless transformations. Structure-property relationships in commercial materials.
Prerequisite(s): MMAE 365
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 465
Electrical, Magnetic, and Optical Properties of Materials
Electronic structure of solids, semiconductor devices and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anisotropy, magnetic materials and devices. Optical properties and their applications, generation and use of polarized light. Same as PHYS 465.
Prerequisite(s): MMAE 365 or PHYS 348
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 470
Introduction to Polymer Science
An introduction to the basic principles that govern the synthesis, processing and properties of polymeric materials. Topics include classifications, synthesis methods, physical and chemical behavior, characterization methods, processing technologies and applications. Credit will only be granted for CHE 470, CHEM 470, MMAE 470.
Prerequisite(s): CHEM 124 and MATH 251 and PHYS 221
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 472
Advanced Aerospace Materials
Principles of materials and process selection for minimum weight design in aerospace applications. Advanced structural materials for aircraft fuselage and propulsion applications. Materials for space vehicles and satellites. Environmental degradation in aerospace materials.
Prerequisite(s): MMAE 372
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 473
Corrosion: Materials Reliability and Protective Measures
This course covers the basics of corrosion science (fundamentals and mechanisms) and corrosion engineering (protection and control). The various forms of corrosion (uniform, pitting, crevice, stress corrosion cracking, etc.) are illustrated along with practical protective measures (coatings, inhibitors, electrochemical protection, materials upgrade, etc.). The course highlights the concept of alloy design to minimize corrosion, the properties of steels, stainless steels, and high-performance alloys along with case studies of corrosion failures and lessons learned. In addition, the special aspects of corrosion in batteries, fuel cells, electrolyzers, and photovoltaic cells will be discussed and illustrated with examples.
Prerequisite(s): MMAE 365
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 476
Materials Laboratory II
Team design projects focused on the processing and/or characterization of metallic, non-metallic, and composite materials. Students will work on a capstone design problem with realistic constraints, perform experimental investigations to establish relationships between materials structures, processing routes and properties, and utilize statistical or computational methods for data analysis.
Prerequisite(s): MMAE 370
Lecture: 1 **Lab:** 6 **Credits:** 3

MMAE 482
Composites
This course focuses on metal, ceramic and carbon matrix composites. Types of composite. Synthesis of precursors. Fabrication of composites. Design of composites. Mechanical properties and environmental effects. Applications.
Prerequisite(s): MS 201
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 484
Materials and Process Selection
Decision analysis. Demand, materials and processing profiles. Design criteria. Selection schemes. Value and performance oriented selection. Case studies.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 485
Manufacturing Processes
Principles of material forming and removal processes and equipment. Force and power requirements, surface integrity, final properties and dimensional accuracy as influenced by material properties and process variables. Design for manufacturing. Factors influencing choice of manufacturing process.
Prerequisite(s): MMAE 332 or MMAE 372
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 490
Crystallography and Crystal Defect
Geometrical crystallography - formal definitions of lattices, systems, point groups, etc. Mathematical methods of crystallographic analysis. Diffraction techniques: X-ray, electron and neutron diffraction. Crystal defects and their influence on crystal growth and crystal properties.
Lecture: 3 **Lab:** 0 **Credits:** 3

MMAE 491
Undergraduate Research
Student undertakes an independent research project under the guidance of an MMAE faculty member. Requires the approval of the MMAE Department Undergraduate Studies Committee.
Credit: Variable

MMAE 494
Undergraduate Design Project
Student undertakes an independent design project under the guidance of an MMAE faculty member. Requires the approval of the MMAE Department Undergraduate Studies Committee.
Credit: Variable

MMAE 497
Undergraduate Special Topics
Special individual design project, study, or report as defined by a faculty member of the department. Requires junior or senior standing and written consent of both academic advisor and course instructor.
Credit: Variable

Military Science (MILS)

MILS 101
Introduction to Military Science and Critical Thinking
MILS 101 is an introduction to the Army and the Profession of Arms. Students will examine the Army Profession and what it means to be a professional in the U.S. Army. The overall focus is on developing basic knowledge and comprehension of the Army Leadership Requirements Model, to develop critical thinking skills through scenario-based applications, and its advantages for the student. Students also learn how resiliency and fitness support their development as a future leader.
Lecture: 1 **Lab:** 2 **Credits:** 1

MILS 102
Basic Leadership
Establishes foundation of basic leadership fundamentals such as problem solving, communications, briefings and effective writing, goal setting techniques for improving listening and speaking skills, and an introduction to counseling.
Lecture: 1 **Lab:** 2 **Credits:** 1
Satisfies: Communications (C)

MILS 107
American Military History
Study of American military history through examination of evolvement of the Army and warfare.
Lecture: 3 **Lab:** 2 **Credits:** 3

MILS 147
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 148
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 199
Military Topics
Approval of the department. Research and study of selected topics. A practical laboratory is required. May be repeated if topics vary. Students may register in more than one section per term.
Lecture: 3 **Lab:** 0 **Credits:** 3

MILS 201
Individual Leadership Studies
Students identify successful leadership characteristics through observation of others and self and through experiential learning exercises. Students record observed traits (good and bad) in a dimensional leadership journal and discuss observations in small group settings.
Lecture: 2 **Lab:** 2 **Credits:** 2

MILS 202
Leadership and Teamwork
Study examines how to build successful teams, various methods for influencing action, effective communication in setting and achieving goals, the importance of timing the decision, creativity in the problem solving process, and obtaining team buy-in through immediate feedback.
Lecture: 2 **Lab:** 2 **Credits:** 2

MILS 247
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 248
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 301
Leadership and Problem Solving
Students conduct self-assessment of leadership style, develop personal fitness regimen, and learn to plan and conduct individual/small unit tactical training while testing reason and problem-solving techniques. Students receive direct feedback on leadership abilities.
Lecture: 3 **Lab:** 2 **Credits:** 3
Satisfies: Communications (C)

MILS 302
Leadership and Ethics
Examines the role communications, values, and ethics play in effective leadership. Topics include ethical decision-making, consideration of others, spirituality in the military, and survey Army leadership doctrine. Emphasis on improving oral and written communication abilities.
Prerequisite(s): MILS 301
Lecture: 3 **Lab:** 2 **Credits:** 3
Satisfies: Communications (C)

MILS 347
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 348
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 350
Military Civil and Public Affairs
This course is an expansion of Military Presence in towns, villages, and cities where it would be necessary for a military government to assume responsibilities for the administration of the government functions. An added feature of the course would be the development of positive relationships with civilians and government officials. The preparation of news and information releases and related operations.
Lecture: 0 **Lab:** 0 **Credits:** 3

MILS 394
Advanced Military Topics
Approval of the department. Study of advanced topics in military science. A practical laboratory is required. May be repeated if topics vary. Students may register in more than one section per term.
Lecture: 3 **Lab:** 0 **Credits:** 3

MILS 399
Advanced Independent Research
Approval of the department. Intensive research and study of selected topics. A practical laboratory is required. May be repeated to maximum of 6 hours if topics vary. Students may register in more than one section per term.
Lecture: 0 **Lab:** 3 **Credits:** 3

MILS 401
Leadership and Management
Develops student proficiency in planning and executing complex operations, functioning as a member of a staff, and mentoring subordinates. Students explore training management, methods of effective staff collaboration, and developmental counseling techniques.
Prerequisite(s): MILS 302 and MILS 301
Lecture: 3 **Lab:** 2 **Credits:** 3
Satisfies: Communications (C)

MILS 402
Officership
Study includes case study analysis of military law and practical exercises on establishing an ethical command climate. Students must complete a semester long Senior Leadership Project that requires them to plan, organize, collaborate, analyze, and demonstrate their leadership skills.
Prerequisite(s): MILS 301 and MILS 401 and MILS 302
Lecture: 3 **Lab:** 2 **Credits:** 3
Satisfies: Communications (C)

MILS 447
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 448
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
Lecture: 0 **Lab:** 3 **Credits:** 2

MILS 499
Advanced Independent Research
Intensive research and study of selected topics. May be repeated for a maximum of six credit hours. A practical laboratory is required for Army ROTC cadets.
Credit: Variable

Naval Science (NS)

NS 101
Introduction to Naval Science
A general introduction to the USN and USMC that emphasizes organizational structure, warfare components, and assigned roles/missions of USN/USMC, covers all aspects of Naval Science from its relative position within DoD to the specific warfare communities/career paths, and includes basic elements of leadership and Navy Core Values. The course will provide students with initial exposure to many elements of Naval culture and provides conceptual framework/working vocabulary for students to use on summer cruise.
Corequisite(s): NS 499
Lecture: 2 **Lab:** 0 **Credits:** 2

NS 102
Naval Ships Systems I (Engineering)
Students learn detailed ship design, hydrodynamic forces, stability, propulsion, electrical theory and distribution, hydraulic theory and ship control, and damage control. The course includes basic concepts of theory/design of steam, gas turbine, diesel, and nuclear propulsion. Case studies on leadership/ethical issues in the engineering arena are also covered. Not required for Nurse and Marine Corps options.)
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3

NS 201
Naval Ships Systems II (Weapons)
The course outlines the theory and employment of weapons systems. Students explore the processes of detection, evaluation, threat analysis, weapon selection, delivery, guidance, and explosives. Fire control systems and major weapon types are discussed, including capabilities and limitations. The physical aspects of radar and underwater sound are described. Facets of command, control, communications, computers, and intelligence are explored as a means of weapons systems integration. The tactical and strategic significance of command and control warfare and information warfare is discussed. This course is supplemented with review/analysis of case studies involving the moral and ethical responsibilities of leaders in the employment of weapons. Not required for Nurse and Marine Corps options.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3

NS 202
Seapower and Maritime Affairs
A study of the U. S. Navy and the influence of sea power upon history that incorporates both a historical and political science process to explore the major events, attitudes, personalities, and circumstances that have done the following: imbued the U. S. Navy with its proud history and rich tradition; deals with issues of national imperatives in peacetime, as well as war, varying maritime philosophies that were interpreted into Naval strategies/doctrines, budgetary concerns which shaped force realities, and the pursuit of American diplomatic objectives; and concludes with a discussion of the Navy's strategic and structural changes at the end of the Cold War and its new focus, mission, and strategy in the post September 11, 2001, world. For Nurse Corps only; course may be taken in sophomore year.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

NS 301
Navigation
In-depth study of the theory, principles, procedures, and application of plotting, piloting, and electronic navigation as well as an introduction to maneuvering boards. Students learn piloting techniques, the use of charts, the use of visual and electronic aids, and the theory of operation of both magnetic and gyrocompasses. Students develop practical skills in plotting and electronic navigation. Other topics include tides, currents, effects of wind/weather, voyage planning, and an application and introduction to the international/inland rules of navigation. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts listed above. Not required for Nurse and Marice Corps options.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3

NS 302
Naval Operations and Seamanship
A continued study of relative motion, formation tactics, and ship employment. Introductions to naval operations and operations analysis, ship behavior and characteristics in maneuvering, applied aspects of ship handling, afloat communications, naval command and control, naval warfare areas, and joint warfare are also included. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts listed above. Not required for Nurse and Marine Corps options.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3

NS 310
Evolution of Warfare
Students trace the development of warfare to the present day. This course is designed to cover the causes of continuity and change in the means and methods of warfare. It addresses the influence of political, economic, and societal factors on the conduct of war with significant attention focused on the role of technological innovation in changing the battlefield. Students will explore the contribution of preeminent military theorists and battlefield commanders to our modern understanding of the art and science of war. Required for Marine option and MECEP students; optional for Navy students.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

NS 401
Leadership and Management
The course introduces the student to many of the fundamental concepts of leading Sailors and Marines which shall be expanded upon during the continuum of leadership development throughout NROTC, and develops the elements of leadership vital to the effectiveness of Navy/Marine Corps officers by reviewing the theories and parameters of leadership and management within and outside of the Naval service and progressing through values development, interpersonal skills, management skills, and application theory. Practical applications are explored through the use of experiential exercises, readings, case studies, and laboratory discussions.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

NS 402
Naval Leadership and Ethics
The course completes the final preparations of ensigns and second lieutenants for service in the Fleet and Marine Corps. The course integrates an intellectual exploration of Western moral traditions and ethical philosophy with a variety of topics such as the following: military leadership, core values, and professional ethics; the UCMJ and Navy regulations; and discussions relating to the roles of enlisted members, junior and senior officers, command relationships, and the conduct of warfare. The course provides midshipmen with a foundation of moral traditions combined with a discussion of actual current and historical events in the United States Navy and Marine Corps to prepare them for the role and responsibilities of leadership in the Naval Science of the 21st century.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Ethics (E)

NS 405
Leadership and Management Seminar
A six-hour seminar augmenting Theory of Organization and Management (BUS 301). This seminar addresses leadership, management, and other organizational behavior issues facing junior officers, to include strategic and tactical planning, time-management, communication, counseling, team-building, and decision-making in a stressful environment. Required for Naval ROTC students. Normally taken concurrently with BUS 301 and in place of NS 401.
Corequisite(s): MGT 351
Lecture: 0 **Lab:** 1 **Credits:** 0

NS 411
Fund of Maneuver Warfare
This course introduces broad aspects of armed conflict and interactions using modern maneuver warfare doctrine. Students trace historical influences on the tactical, operational, and strategic implications of maneuver warfare practices in current and future operations. This course also covers the structure and capabilities of the present day U.S. Marine Corps organization as a forward deployed and rapid response force and its development of expeditionary maneuver warfare concepts. The focus is to train students to be practitioners of maneuver warfare and use lessons from the past as the basis for making practical judgments during armed conflict. Required for Marine options and MECEP students.
Corequisite(s): NS 499
Lecture: 3 **Lab:** 0 **Credits:** 3

NS 497
Special Topics
This course provides midshipmen with an opportunity to work under the supervision of an officer/instructor on projects related to professional development. Department permission required.
Credit: Variable

NS 499
Naval Science Laboratory
Topics deal with general Navy/Marine Corps mission and policies, force protection, operational security, watch standing, physical fitness, nutrition, stress management, and other professional development subjects.
Lecture: 2 **Lab:** 3 **Credits:** 1

Philosophy (PHIL)

PHIL 301
Ancient Philosophy
A study of major works by Plato, Aristotle, and other important ancient philosophers.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 302
Origins of Modern Philosophy
The study of major 17th and 18th century philosophers, such as Descartes, Hobbes, Spinoza, Locke, Leibniz, Berkeley, Hume, and Kant.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 304
Judgment and Decision-Making
A philosophical and psychological examination of good reasoning, the origins of judgment errors and biases, the impact of reasoning on individuals and societies, and the methods for improving judgment.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 305
Twentieth Century Philosophy
A study of recent philosophical trends (or movements), including logical positivism, existentialism, ordinary language philosophy, etc.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 306
Rationality and Science Policy
A realistic, evidence-based look at the powers and challenges in making science policy, looking at such topics as group polarization, conspiracy theories, deference to experts and "judging from the gut". Our goal is to identify the reasoning skills and knowledge necessary in order for citizens and political officials to reason reliably about scientific matters.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 308
Philosophy and Psychology of Language
A richly illustrated examination of the evidence for the nature and origin of language, from both philosophical and psychological perspectives. The course will cover such topics as animal communication, reference, the nature of meaning, and the biological basis of language.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 311
Great Philosophers
An in-depth study of a single outstanding philosopher, chosen by the instructor. The focus of the course will be announced when the course is scheduled.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 326
Philosophy of Language
An analysis of the concept of language in both the works of philosophers and the works of linguists. The course looks into theories of linguistic meaning, sentence structure, speech acts, and the assumptions underlying research in modern linguistics.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 328
Comparative Philosophy
This course draws upon two or more widely different traditions in considering one or more topics of philosophical interest. Usually, the course will include both Western and non-Western sources. The course may be organized around a given philosophical issue or may compare and contrast two or more thinkers from the relevant traditions.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 332
Political Philosophy
Examination of different conceptions of legitimate political authority; includes discussion of ideas of social justice, natural rights, sovereignty.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 333
Social Philosophy
A systematic examination of contemporary Social issues such as abortion, euthanasia, war, environmental destruction, poverty, terrorism, and sexual morality.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 336
Metaphysics
Metaphysics.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 341
Philosophy of Science
Through an analysis of the concepts of explanation, theory, hypothesis, experiment, and observation, this course seeks an understanding of how the growth of scientific knowledge is possible.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 342
Philosophy of Mind
An examination of the conception of "mind" as opposed to body implications for psychology, artificial intelligence, and neuroscience.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 343
Philosophy of Social Inquiry
An examination of the methods and theories of the social sciences, especially sociology and anthropology, and their relationships to the natural sciences.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 350
Science and Method
A history of interaction between science and philosophy showing how changing conceptions of metaphysics and scientific method have influenced the development of Renaissance astronomy, nineteenth century atomic theory, ether theories, theories of geological and biological change, etc.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 351
Science and Values
This course will consider questions such as: What role should values play in scientific inquiry? Should scientists consider only epistemic or cognitive values, or should they also take into account social and cultural values? Could science be objective and make progress if it is shaped by social and cultural values?.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 360
Ethics
A study of the fundamental issues of moral philosophy.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 362
Philosophy of Law
An analysis of the concept of law and how it differs from custom, religion, and morality. The course looks into issues of judicial reasoning, the assumptions that underlie the criminal justice system and the imposition of liability, and legal ethics.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 363
Aesthetics
The philosophy of the fine arts, including an analysis of the concepts of beauty, representation, expression and the purpose of art.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 365
Philosophy of Free Speech
Analysis of the philosophical foundations of the right of free speech within the American Constitution’s framework. Topics include: the philosophical underpinnings of the right of free speech, judicial review under the Constitution, selected free speech issues such as libel, defamation, speech in the workplace, pornography, flag-burning, and others.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 370
Engineering Ethics
A study of the problems of moral and social responsibility for the engineering profession, including such topics as safety, confidentiality and government regulation.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 371
Ethics in Architecture
A study of the moral problems architects must resolve in the practice of their profession, including problems of confidentiality, candor, esthetics, and economy arising from the special responsibilities of architects to and public, client, employer, and colleagues.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 373
Business Ethics
Ethical issues relating to individual and corporate responsibility, self and governmental regulation, investment, advertising, urban problems, the environment, preferential hiring.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 374
Ethics in Computer Science
Moral problems that confront professionals in computer-related fields, including questions raised by the concept of intellectual property and its relationship to computer software, professional codes of ethics for computer use, responsibility for harm resulting from the misuse of computers.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 377
Communication Law and Ethics
This course explores ethical and legal issues concerning communication in diverse contexts, such as: the mass media - e.g. print, broadcast, and electronic; government and politics; organizational hierarchies - e.g. public and private sector workplaces; academic life - e.g. the classroom, student, and faculty affairs; and interpersonal relations - e.g. love, friendship, marriage.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 380
Topics in Philosophy
An investigation into a topic of current interest in philosophy; which will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Humanities (H)

PHIL 490
Independent Study
Supervised individual research for advanced students. Instructor permission required.
Credit: Variable
Satisfies: Communications (C), Humanities (H)

PHIL 491
Independent Study
Supervised individual research for advanced students. **Instructor permission required.**
Prerequisite(s): HUM 102 or HUM 104 or HUM 106 or HUM 200-299
Credit: Variable
Satisfies: Humanities (H)

Physics (PHYS)

PHYS 100
Intro to the Profession
Introduction to the physical sciences, scientific method, computing tools, and interrelations of physical sciences with chemistry, biology and other professions.
Lecture: 2 **Lab:** 0 **Credits:** 2
Satisfies: Communications (C)

PHYS 120
Astronomy
A descriptive survey of observational astronomy, the solar system, stellar evolution, pulsars, black holes, galaxies, quasars, the origin and fate of the universe.
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 123
General Physics I: Mechanics
Vectors and motion in one, two and three dimensions. Newton's Laws. Particle dynamics, work and energy. Conservation laws and collisions. Rotational kinematics and dynamics, angular momentum and equilibrium of rigid bodies. Gravitation. Oscillations.
Prerequisite(s): MATH 151*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

PHYS 200
Introduction to Energy, Waves, Materials, and Forces
This course will address the basic physical principles and concepts associated with energy, power, heat, light, sound, circuits, materials, fluids, and forces. Although quantitative at times, the course will stress conceptual understanding and practical applications.
Lecture: 4 **Lab:** 0 **Credits:** 4
Satisfies: Natural Science (N)

PHYS 221
General Physics II: Electricity and Magnetism
Waves charge, electric field, Gauss' Law and potential. Capacitance, resistance, simple a/c and d/c circuits. Magnetic fields, Ampere's Law, Faraday's Law, induction, and Maxwell's equations. Traveling waves, electromagnetic waves, and light.
Prerequisite(s): (MATH 149 or MATH 151) and MATH 152* and PHYS 123, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

PHYS 223
General Physics III
Sound, fluid mechanics and elasticity. Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Reflection, refraction, interference and diffraction. Special relativity. Quantization of light, charge and energy.
Prerequisite(s): PHYS 221
Lecture: 3 **Lab:** 3 **Credits:** 4
Satisfies: Communications (C)

PHYS 224
General Physics III for Engineers
Sound and fluid mechanics. Temperature, first and second laws of thermodynamics, kinetic theory and entropy. Reflection, refraction, interference and diffraction. Special relativity. Light and quantum physics, structure of the hydrogen atom. Atomic physics, electrical conduction in solids, nuclear physics, particle physics and cosmology.
Prerequisite(s): PHYS 123 and MATH 152 and PHYS 221
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 240
Computational Science
This course provides an overview of introductory general physics in a computer laboratory setting. Euler-Newton method for solving differential equations, the trapezoidal rule for numerical quadrature and simple applications of random number generators. Computational projects include the study of periodic and chaotic motion, the motion of falling bodies and projectiles with air resistance, conservation of energy in mechanical and electrical systems, satellite motion, using random numbers to simulate radioactivity, the Monte Carlo method, and classical physical models for the hydrogen molecule and the helium atom.
Prerequisite(s): PHYS 221 and (CS 104 or CS 105 or CS 115)
Lecture: 2 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

PHYS 300
Instrumentation Laboratory
Basic electronic skills for scientific research. Electrical measurements, basic circuit analysis, diode and transistor circuits. Transistor and integrated amplifiers, filters, and power circuits. Basics of digital circuits, including Boolean algebra and design of logic circuits.
Prerequisite(s): PHYS 221
Lecture: 2 **Lab:** 4 **Credits:** 4
Satisfies: Communications (C)

PHYS 301
Mathematical Methods of Physics
Real and complex numbers and their properties. Vectors, matrices, eigenvalues, eigenvectors, diagonalization of matrices and quadratic forms, and applications. Fourier series, integrals, and transform. Basic probability. Orthogonal polynomials and special functions. Partial differential equations and separation of variables method. Calculus of complex variables.
Prerequisite(s): MATH 252 and MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 304
Thermodynamics and Statistical Physics
Statistical basis of thermodynamics, including kinetic theory, fundamentals of statistical mechanics, fluctuations and noise, transport phenomena and the Boltzmann equation. Thermodynamic functions and their applications, first and second laws of thermodynamics.
Prerequisite(s): PHYS 223 or PHYS 224
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 308
Classical Mechanics I
Newton's Laws, one-dimensional motion, vector methods, kinematics, dynamics, conservation laws, and the Kepler problem. Collisions, systems of particles, and rigid-body motion. Approximation techniques, Lagrangian and Hamiltonian formulations of classical mechanics, small oscillations.
Prerequisite(s): MATH 252 and (PHYS 223 or PHYS 224)
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 309
Classical Mechanics II
Newton's Laws, one dimensional motion, vector methods, kinematics, dynamics, conservation laws, and the Kepler problem. Collisions, systems of particles, and rigid-body motion. Approximation technique, Lagrangian and Hamiltonian formulations of classical mechanics, small oscillations.
Prerequisite(s): MATH 252 and (PHYS 223 or PHYS 224) and PHYS 308
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 348
Modern Physics for Scientists and Engineers
An introduction to modern physics with the emphasis on the basic concepts that can be treated with elementary mathematics. Subjects covered include Bohr atom, elementary wave mechanics and an introduction to quantum mechanics, atom and molecular spectra, nuclear, and particle physics.
Prerequisite(s): PHYS 223
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 360
Introduction to Astrophysics
This course provides an overview of astrophysics and introduces the student to the many conventions, units, coordinate systems, and nomenclature used in astrophysics. The course will survey observational, stellar, and extragalactic astrophysics as well as cosmology. The course will also include planetary astronomy including extrasolar planets.
Prerequisite(s): PHYS 221 and (CHEM 122 or CHEM 124)
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

PHYS 361
Observational Astrophysics
This lecture/lab class covers the basics of multiwavelength observational astrophysics. Topics covered include statistical analysis techniques, multi-wavelength telescope design, instrument design (including CCDs, spectrographs and PMTs), and best practices applicable in different observational bands.
Prerequisite(s): PHYS 221 and PHYS 360 and (CHEM 122 or CHEM 124)
Lecture: 3 **Lab:** 1 **Credits:** 4
Satisfies: Natural Science (N)

PHYS 403
Relativity
Introduction to the special and general theories of relativity. Lorentz covariance. Minkowski space. Maxwell's equations. Relativistic mechanics. General coordinate covariance, differential geometry, Riemann tensor, the gravitational field equations. Schwarzschild solution, astronomical and experimental tests, relativistic cosmological models.
Prerequisite(s): PHYS 308 and MATH 251
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 404
Subatomic Physics
Historical introduction; general survey of nuclear and elementary particle physics; symmetries and conservation laws; leptons, quarks, and vector bosons; unified electromagnetic and weak interactions; the parton model and quantum chromodynamics.
Prerequisite(s): PHYS 223 and PHYS 224
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 405
Fundamentals of Quantum Theory I
A review of modern physics including topics such as blackbody radiation, the photoelectric effect, the Compton effect, the Bohr model of the hydrogen atom, the correspondence principle, and the DeBroglie hypothesis. Topics in one-dimensional quantum mechanics such as the particle in an infinite potential well, reflection and transmission from potential wells, barriers, and steps, the finite potential well and the quantum harmonic oscillator. General topics such as raising and lowering operators, Hermitian operators, commutator brackets and the Heisenberg Uncertainty Principle are also covered. Many particle systems and the Pauli Exclusion Principle are discussed. Three-dimensional quantum mechanical systems, orbital angular momentum, the hydrogen atom.
Prerequisite(s): MATH 252 and (PHYS 224 or PHYS 223)
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 406
Fundamentals of Quantum Theory II
Zeeman and Stark Effects. Addition of spin and orbital angular momenta, the matrix representation of quantum mechanical operators, the physics of spin precession and nuclear magnetic resonance. Time independent and time dependent perturbation theory, Fermi's Golden Rule and the physics of radiation emitted in the course of atomic transitions. Indistinguishable particles in quantum mechanics, the helium atom. Scattering theory, using partial wave analysis and the Born approximation.
Prerequisite(s): PHYS 405
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 410
Molecular Biophysics
The course covers thermodynamic properties of biological molecules, irreversible and open systems, information theory, biophysical measurements, the structure and properties of proteins, enzyme action, the structure and properties of nucleic acids, genetics at the molecular level, and molecular aspects of important biological systems.
Prerequisite(s): CHEM 343 or PHYS 224 or PHYS 223
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 412
Modern Optics and Lasers
Geometrical and physical optics. Interference, diffraction, and polarization. Coherence and holography. Light emission and absorption. Principles of laser action, characterization of lasers, and laser applications.
Prerequisite(s): CS 105 and (PHYS 223 or PHYS 224)
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 413
Electromagnetism I
Differentiation and integration of vector fields, and electrostatics and magnetostatics. Calculation of capacitance, resistance, and inductance in various geometries.
Prerequisite(s): PHYS 221 and MATH 252
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 414
Electromagnetism II
Propagation and generation of electromagnetic radiation. Antennas and waveguides. Maxwell's equations. Electromagnetic properties of materials. Classical electrodynamics; special relativity.
Prerequisite(s): PHYS 413
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 415
Solid State Electronics
Energy bands and carrier transport in semi-conductors and metals. Physical principles of p-n junction devices, bipolar junction transistors, FETS, Gunn diodes, IMPATT devices, light-emitting diodes, semiconductor lasers.
Prerequisite(s): PHYS 223 or PHYS 224
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 418
Introduction to Lasers
Nature of light. Coherence and holography. Light emission and absorption. Principles of laser action. Characteristics of gas lasers, organic dye lasers, solid state lasers. Laser applications.
Prerequisite(s): PHYS 224 or PHYS 223
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 420
Bio-Nanotechnology
In this multidisciplinary course, we will examine the basic science behind nanotechnology and how it has infused itself into areas of nanofabrication, biomaterials, and molecular medicine. This course will cover materials considered basic building blocks of nanodevices such as organic molecules, carbon nanotubes, and quantum dots. Top-down and bottom-up assembly processes such as thin film patterrning through advanced lithography methods, self-assembly of molecular structures, and biological systems will be discussed. Students will also learn how bionanotechnology applies to modern medicine, including diagnostics and imaging and nanoscale, as well as targeted, nanotherapy and finally nanosurgery.
Prerequisite(s): PHYS 224 or PHYS 223
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 425
High Energy Astrophysics
High-energy astrophysics covers interactions in the most extreme physical conditions across the cosmos. Included in this course are the physics of black holes, neutron stars, large scale jets, accretion, shocks, and particle acceleration. Emission mechanisms resulting from relativistic particle acceleration are covered including synchrotron radiation and Bremsstrahlung and Compton processes. Recent observations of X-ray to TeV gamma-ray energies have contributed significantly to understanding these phenomena and will be highlighted.
Prerequisite(s): (MATH 252 and MATH 251) and (PHYS 224 or PHYS 223)
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 427
Advanced Physics Laboratory I
Experiments related to our present understanding of the physical world. Emphasis is on quantum phenomena in atomic, molecular, and condensed matter physics, along with the techniques of measurement and data analysis. The second semester stresses project-oriented experiments on modern topics including spectroscopy, condensed matter physics, and nuclear physics.
Prerequisite(s): PHYS 224 or PHYS 223
Lecture: 3 **Lab:** 2 **Credits:** 3
Satisfies: Communications (C)

PHYS 428
Advanced Physics Laboratory II
Experiments related to our present understanding of the physical world. Emphasis is on quantum phenomena in atomic, molecular, and condensed matter physics, along with the techniques of measurement and data analysis. The second semester stresses project-oriented experiments on modern topics including spectroscopy, condensed matter physics and nuclear physics.
Prerequisite(s): PHYS 427
Lecture: 2 **Lab:** 3 **Credits:** 3

PHYS 437
Solid State Physics
Crystal structure and binding, lattice vibrations, phonons, free electron model, band theory of electrons. Electrical, thermal, optical, and magnetic properties of solids. Superconductivity.
Prerequisite(s): PHYS 405
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 440
Computational Physics
Root finding using the Newton-Raphson method; interpolation using Cubic Splines and Least Square Fitting; solving ordinary differential equations using Runge-Kutta and partial differential equations using Finite Difference and Finite Element techniques; numerical quadrature using Simpson's Rule, Gaussian Quadrature and the Monte Carlo method; and spectral analysis using Fast Fourier Transforms. These techniques are applied to a wide range of physics problems such as finding the energy levels of a finite quantum well using a root finding technique, solving the Schrodinger equation using the Runge-Kutta-Fehlberg method, using random numbers to simulate stochastic processes such as a random walk, using the Fast Fourier Transform method to perform a spectral analysis on non-linear chaotic systems such as the Duffing oscillator, and using auto-correlation functions to simulate sonar or radar ranging problems.
Prerequisite(s): PHYS 240 and (PHYS 223 or PHYS 224)
Lecture: 1 **Lab:** 4 **Credits:** 3

PHYS 460
Stellar Astrophysics
This course will cover the formation, structure, and evolution of stars. Stellar remnants (white dwarfs, neutron stars, and black holes) will also be covered. Aspects of the interstellar medium relevant to star formation will be covered as well.
Prerequisite(s): PHYS 360
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 461
Extragalactic Astrophysics
This course will cover galaxy morphology, dynamics, and structure. This course will also cover cosmology including dark matter, dark energy, and fate of the universe.
Prerequisite(s): PHYS 360
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 465
Electrical, Magnetic, and Optical Properties
Electronic structure of solids, semiconductor devices, and their fabrication. Ferroelectric and piezoelectric materials. Magnetic properties, magnetocrystalline anisotropy, magnetic materials and devices. Optical properties and their applications, generation, and use of polarized light. Same as MMAE 465.
Lecture: 3 **Lab:** 0 **Credits:** 3

PHYS 485
Physics Colloquium
Lectures by prominent scientists. This course exposes students to current and active research in physics both within and outside the IIT community. It helps prepare students for a career in research. It is complementary to our academic courses and provides examples of professional/scientific presentations. This course may not be used to satisfy the natural science general education requirement.
Prerequisite(s): PHYS 223 or PHYS 224
Lecture: 1 **Lab:** 0 **Credits:** 1

PHYS 491
Undergraduate Research
Recommendation of advisor and approval of the department chair. Student participation in undergraduate research, usually during the junior or senior year.
Credit: Variable

PHYS 494
Research Project
Special research and development projects in X-ray optics, instrumentation, X-ray techniques for industrial applications, mechanical and opto-mechanical design and instrumentation, and thermal management techniques and systems.
Credit: Variable

PHYS 497
Special Topics in Physics
Special topics in physics.
Credit: Variable

PHYS 498
Research Honors Thesis Preparation
Background and research following a summer research honors project, preparing to write a research honors thesis in Physics 499. Student will organize a review committee to direct and review the research.
Credit: Variable

PHYS 499
Research Honors Thesis
Background and laboratory research and thesis writing following a summer research project and thesis preparation. The student will meet regularly with his or her committee during thesis preparation and will write and defend thesis.
Credit: Variable

Political Science (PS)

PS 200
American Government
Surveys American politics and government. Informal political institutions, such as parties and interest groups, are analyzed and related to formal governmental institutions, such as the presidency and the Congress. Emphasis is placed on how the American political culture shapes these institutions and how public policies are produced.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 214
State and Local Government
Investigates the relationships among federal, state/provincial, metropolitan/regional, and local units of government, examining theories of federalism, constitutional foundations, judicial interpretations, administrative actions, and current trends and debates. The United States and other federal systems serve as case countries. The course also explores how federalism is being shaped by such factors as globalization, environmental challenges, tribal sovereignty, and terrorism.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 230
International Relations
Introduces students to the major theories and concepts needed to understand compelling issues confronting the international system. Students will examine how thinking and practice have evolved on such fundamental matters as war, peace, and national security; weapons proliferation; human rights; political economy; international aid and sustainable development; regional integration; and the roles and functions of international and non-governmental organizations.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 232
Democracy, Dictatorship, and Development
Introduces students to the most common theories and approaches in contemporary comparative political analysis. Students then employ the tools of comparison developed in an examination of the causes and consequences of political instability and conflict and transitions to stable democracy.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 242
American Foreign Policy
Explores how American foreign policy is made and why it matters both in the context of domestic politics and for the international system as a whole. Students will identify U. S. foreign policy goals and critique foreign policy implementation.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 285
Special Topics in Political Science
Investigates a topic of current interest at the introductory level. Topic will be announced by instructor at scheduling time. There are no prerequisites for this course. Course may be taken multiple times provided the topic is different each time.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 306
Politics and Public Policy
Analyzes public policy processes with a primary focus on the United States and a secondary focus on cross-country comparisons involving the U. S. The overarching concern is the effectiveness of government intervention given our market-based system. The student will become familiar with models and determinants of policy making. Beyond theories of policy making, the course also surveys a number of timely policy issues. In this way, a balance is reached between theory and application. There will be an underlying focus on the American political economy and public policy making, but students do not need an extensive background in either economics or policy making.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 313
Comparative Public Policy
Considers why policies on issues like social welfare, health care, education, immigration, and others differ from country to country, looking for answers in such factors as political culture, level of economic development and equality, institutional frameworks and actors, social organization, or some mix of those explanations.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 315
Urban Politics
Examines city and metropolitan politics and government. The course emphasizes how economic and demographic changes influence local politics, how local politics work, and how state and national policies influence local politics.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 317
Chicago Politics
Studies Chicago's politics and government from both historical and contemporary perspectives. Emphasis is placed on changes that have significantly shaped the direction of Chicago's politics. Special attention is devoted to social class, ethnicity, race, and ideology as factors that have influenced the Democratic political machine and its opponents.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 329
Environmental Politics and Policy
Students look at the complexities of making and implementing environmental policy at the local, national, regional, and/or global levels. Emphasis will be placed the ways that conflict and cooperation among multiple economic, social, and political interests contribute to the successes and failures of environmental policy. Topics for in depth study may include global warming, air and water pollution, depletion of natural resources, biodiversity conservation, environmental communication, and the roles played by international organizations, local and national governments, businesses, and non-governmental organizations.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 332
Politics of Science and Technology
Explores the complex interrelationships among science, technology, and politics, with emphasis on the political issues created by contemporary scientific advances. The course gives roughly equal attention to the politics of scientific discovery; the development of organizations providing scientific advice to government; the impact of industrialized science and advanced technology on the economy and society; and the growing debate over the social implications of science and technology and how they can be predicted, measured, and controlled.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 338
Energy Policy
This course traces our dependence on fossil fuels and government-based attempts to promote energy conservation and develop alternate energy sources. Assessed are the economic and political effects of the supply and demand for energy; the implications of different energy production and consumption methods; and efforts to minimize the environmental consequences through increased energy efficiency and/or regulation. The course explores such problems as fossil fuel dependence, greenhouse gas emissions reductions, nuclear waste, rapid industrialization, and national and international attempts to provide economic, political, and technological solutions.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 351
Public Administration
Examines the nature of administrative organization, decision-making in organization, and organizational structures and processes: division of work, authority, communications, and planning. The course considers the role of the government executive and analyzes the relationship between fiscal procedures and personnel management in organizations.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 354
Urban Policy
Explores major dilemmas facing cities today, including changing economic and tax bases, fiscal stresses, marginalized populations, new forms of consumption, and adaptation to structural change. Responses of politicians to pressures to develop new policies and leverage the productive capacity of the city and the impact of citizen preferences are analyzed. Same as SOC 354.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 360
Global Political Economy
Examines the economic, socio-political, and cultural aspects of globalization within the context of both contemporary discussions about the phenomenon and wider debates in the field of political economy. The course also covers aspects of international development, both economic and political.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 372
Government and Politics in Africa
Surveys contemporary African politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 373
East Asian Political Economy
Surveys contemporary East Asian politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 374
Politics of Europe
Surveys contemporary European politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 375
Politics of Latin America
Surveys contemporary Latin American politics in its historical, economic, and cultural context. Both individual country cases and regional issues are examined, and approaches to comparative political analysis are used to understand the causes and consequences of observed patterns of political similarities and differences.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PS 385
Topics in Political Science
Investigates a topic of current interest in Political Science, which will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 388
International Law and Organizations
This course examines structures of global governance using analytical lenses developed by both political scientist and international legal scholars to understand the depth and scope of international law. We will explore the relationships between power, rules, and norms as well as the relative impact of hard versus soft law and more or less legalized institutional structures. These themes will guide us through a comparative survey of international and legal frameworks attached to the US, the International Criminal Court, and the World Trade Organization and those created by regional economic institutions such as the EU and NAFTA.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 408
Methods of Policy Analysis
Introduces students to the field of policy analysis and acquaints them with basic methods of policy analysis and urban planning. Emphasis is on these methods and problem solving rather than on politics or the political process. Topics include decision theory, benefit/cost analysis, problem simulation, population projection, and problem definition and formulation. This seminar serves as the required capstone course for the Policy Analysis/Technology specialization.
Prerequisite(s): PS 300-399 and PS 190-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PS 491
Undergraduate Research in Political Science
Working with a member of the political science faculty, students will choose a topic, conduct research, and complete an original, independent research project.
Prerequisite(s): PS 300-399 and PS 190-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

PS 497
Directed Readings in Political Science
Consists of independent reading and analysis, centered on particular problems and supervised by a member of the Political Science faculty. (Credit: Variable; maximum 3 credit hours)
Prerequisite(s): PS 300-399 and PS 190-299
Credit: Variable
Satisfies: Communications (C), Social Sciences (S)

Psychology (PSYC)

PSYC 100
Introduction to the Profession
Students will: 1) introduce an overview of concepts in psychology; 2) develop professional direction for academic career at IIT; 3) demonstrate psychology information literacy; 4) demonstrate effective communication using a variety of formats; and 5) demonstrate professional competence both within and outside of IIT.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

PSYC 203
Undergraduate Statistics for the Behavioral Sciences
The objectives of this course are to develop skills in using statistical data analysis commonly used in the behavioral sciences (e.g. descriptive statistics, ANOVA, regression, correlation, and meta-analysis). At the end of the course students should be able to comprehend statistical research findings, run basic statistical analysis, as well as make inferences from the results.
Lecture: 3 **Lab:** 1 **Credits:** 4

PSYC 204
Research Methods in Behavioral Science
Introduction to experimental, survey, and field study methodology, including: ethics; research design; collection, preparation, analysis of data; and writing research reports.
Prerequisite(s): (PSYC 221 or PSYC 222) and PSYC 203
Lecture: 3 **Lab:** 1 **Credits:** 4
Satisfies: Communications (C), Natural Science (N)

PSYC 221
Introduction to Psychological Science
Psychologists use the scientific method to understand the behavior and mental processes of individuals. Their investigations into understanding the behavior of individuals span multiple areas including perception, learning, cognition, language, development, motivation, personality, psychological disorders, social, health, and industrial/organization. In addition to the variety of fields, psychology examines behavior at multiple levels such as biological, behavioral, and cultural. This course will: 1) introduce the field of psychological science; 2) explore the research methods psychologists use to answer questions; 3) use research and theory to introduce psychological processes in multiple fields; and 4) to apply psychological theories to mass media.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 238
Professional Skills
Didactic and applied approach to professional skill development in the areas of oral communication, conflict management and interpersonal dimensions of the work setting.
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 250
Introduction to Leadership: Concepts and Practices
A survey of historical and contemporary theories, concepts and complexities associated with leadership. Emphasis will be placed on application of theories to practical experiences of leadership.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 301
Industrial Psychology
Survey of practical applications of psychology to problems of business and industry: work attitudes and behavior; employee selection; morale; safety; turnover; absenteeism; and training.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 303
Introduction to Psychopathology
Overview of various cognitive, emotional, and behavioral disorders, focusing on diagnostic criteria, causal factors, and treatment, and emphasizing scientific, research-oriented perspectives.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 310
Social Psychology
Description and analysis of behavior and experience as determined by social conditions. Includes social issues, human relations, prejudice, and leadership.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 312
Human Motivation and Emotion
This course will provide a broad overview of major theories of human motivation, both historical and contemporary. After learning about these theories, students will explore how researchers have applied these principles in health care, sports, management, education, and virtual/gaming environments.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 320
Applied Correlation and Regression
This course will provide students with the knowledge and skills needed to apply correlation and regression analysis to the study of human behavior. Emphasis will be placed on practical issues associated with these statistical techniques and significant attention will be paid to running analyses and reporting results.
Prerequisite(s): PSYC 203
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 330
Health Psychology
Health psychology applies psychological principles to health promotion and the prevention and treatment of illness. The goal of this course is to provide a thorough understanding of the key concepts and theories important to health psychologists and the skills to think analytically and critically about health issues. The course will cover a broad range of topics including stress, coping, and behaviors that promote health and prevent illness. The course will also cover specific health problems such as HIV/AIDS, cardiovascular disease, diabetes, cancer, eating disorders, and substance abuse and critically examine the underlying biological, psychological, and social factors influencing the onset, course, and outcomes of these diseases.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C)

PSYC 340
Psychology of Gender
This course provides a broad overview of psychological science on gender issues, addressing such topics as gender stereotypes, early gender socialization, gender nonconformity, love and romance, sexuality, work and leadership, and violence. The course will also explore ways that gender intersects with race/ethnicity, sexual orientation, social class, and other social categories.
Prerequisite(s): PSYC 221 with min. grade of C
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 350
Prejudice and Stigma
People differ in the identities they hold across dimensions like race, religion, gender, sexuality, age, ability and socioeconomic status. These identities can be stigmatized within the larger group and have profound effects on people. In this course, we will consider the function and costs of prejudice and stigma for members of both stigmatized and majority (nonstigmatized) groups as well as review research aimed at reducing prejudice and stigma. This course aims to give students the skills necessary to critically understand contemporary instances of prejudice and stigmatization from a social psychological perspective. Another course objective is for students to draw parallels across stigma and prejudice processes while also understanding nuances for each group. A final objective is to give students the opportunity to reflect on personally held beliefs about diverse groups.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 352
Personality Theory
This course will provide an overview of prominent approaches to personality psychology.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 355
Cross-Cultural Psychology
This course is designed to familiarize you with a wide range of topics in cross-cultural psychology. The ability to understand the influence of culture is essential for success in an increasingly diverse and global society. This course will expose you to a variety of topics such as cross-cultural communication, diversity in the workplace, personality and national traits and happiness across cultures. The aim is to provide a framework for appreciating the cultural context of psychological phenomenon in order to facilitate better navigation of diverse societies and workplaces.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 360
Clinical Psychology: Assessment and Treatment
This course will provide an overview of psychological testing and assessment and psychotherapy and professional activities of clinical psychologists. This course will provide an in-depth examination of the concepts and methods of clinical psychology, document the many activities of clinical psychologists, and highlight the trends in the filed that are likely to shape the field in upcoming years. Students will gain an increased understanding of the psychological services and information about clinical psychology as a future career goal.
Prerequisite(s): PSYC 303*, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 362
Human-Computer Interaction and Web Design
Students in this course will learn the importance of human-computer interaction design and the effectiveness of user-centered design. The course will cover a survey of methods frequently used by the HCI profession, such as usability testing and prototyping, as well as general design principles and how to use design guidelines. A particular emphasis will be placed on usability for Web site engineering, and students will apply knowledge from the field in the design and construction of user-centered Web sites. (Co-listed as ITMD362)
Prerequisite(s): ITMD 361
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 363
Introduction to Sports Psychology
In this course, students will explore the major psychological theories related to sport and exercise behavior. The course is designed to introduce students to the field of sport and exercise psychology through a combination of classroom discussion and exercise application. This course will provide students with a broad overview of major topics including: the history of sports and exercise psychology; foundations of personality, self-concept, self-esteem, motivation, and other psychological characteristics related to participation and performance in sports; coaching and leadership in sports; gender and cultural issues; team dynamics; performance enhancement strategies; and sports as recreation.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 370
Health and Safety at Work
This course is designed to familiarize you with a wide range of topics in occupational health psychology (OHP). Understanding the relationship between work and health is vital in the face of increasingly demanding and complex work. This course will expose you to topics that examine how work affects our health and vice versa. These include work organizational factors (organizational justice, dark workplace behaviors such as incivility, shift-work, work-family interface) and their impact on employee health and well-being (stress, emotions, job-burnout, recovery experiences).
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 380
Topics in Psychology
An investigation into a topic of current interest in psychology. The specific topic will be announced by the instructor when the course is scheduled.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 381
Topics in Psychology
An investigation into a topic of current interest in psychology. The specific topic will be announced by the instructor when the course is scheduled.
Prerequisite(s): PSYC 221 or PSYC 301 or PSYC 303 or PSYC 310
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 409
Psychological Testing
This course is designed to introduce you to psychological testing and assessment. After completing this course, you will be familiar with the test development process, testing techniques, and different types of tests. Further, you will learn about the use of tests in educational, organizational, and clinical/counseling settings. In this course, you will learn the underlying principles of psychological testing and measurement including test construction and scale development.
Prerequisite(s): PSYC 203 or PSYC 221 or PSYC 301
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 410
Introduction to Rehabilitation and Mental Health Counseling
Historical, philosophical, ethical, and legal bases of rehabilitation and mental health counseling. Includes a study of professional roles, functions, and responsibilities as well as service delivery systems and practices such as vocational, independent living, and public and private rehabilitation and mental health counseling.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 411
Medical Aspects of Disabling Conditions
Survey of human organ systems, medical terminology, unique characteristics of disabling conditions, including severe disabilities. Vocational consequences, environmental impact and implications for the rehabilitation process. One of a two course sequence.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

PSYC 412
Multicultural and Psychosocial Issues in Rehabilitation and Mental Health Counseling
Review of diversity issues in rehabilitation and mental health counseling including culture, disability, gender, aging, socio-economic status, and spirituality and religion. Includes theories of multicultural counseling and the counselor's role in the promotion of self-awareness and social justice; a study of individual and family adaptation and coping processes following disability; psychological and sociological consequences of disability; attitudes toward persons with disabilities; and the impact of social and environmental barriers.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 414
Neural and Biological Bases of Behavior
An introduction to the biological bases of behavior with an emphasis on neuroanatomy and neurophysiology of sensory and central nervous systems.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Natural Science (N)

PSYC 423
Learning Theory
Learning plays an important role in psychology and the general processes and mechanisms that underscore learning are utilized in a number of fields including neuroscience, clinical science, education, and cognitive science. We will examine several theoretical perspectives on learning including, but not limited to, functionalistic, associationistic, cognitive, social, and neurophysiological. We will also examine how factors such as motivation, artificial intelligence, technology, disability, and intelligence play a role in learning.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 426
Cognitive Science
The goal of this course is to understand how the mind works. Cognitive science is an interdisciplinary field that draws on experimental psychology, computer science, linguistics, animal behavior, neuroscience, and behavioral economics, among others.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 435
Child Development
Developmental psychologists examine behavioral and biological changes as they occur over the entire lifespan. Their investigations into mechanisms of developmental change span biological, behavioral, and cultural levels of organization. Students will be able (1) to identify the major milestones of development in various domains (e.g. perceptual, motor, cognitive, social) and (2) use research and theory to understand the mechanisms by which developmental change occurs.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 436
Adult Development
Explores processes and changes in cognitive, social, physical and emotional functioning across adult life. Requires 9 hours of psychology.
Prerequisite(s): (PSYC 221 and PSYC 303) or PSYC 301 or PSYC 310
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 449
Practicum in Rehabilitation Services
Seminar and supervised fieldwork experience in a rehabilitation setting with disabled individuals. Emphasizes service delivery, interviewing techniques, and caseload management.
Prerequisite(s): SOC 480 and PSYC 412* and PSYC 411 and PSYC 410, An asterisk (*) designates a course which may be taken concurrently.
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 455
Development and Evaluation of Training in Organizations
The goal of this course is to provide the learner with a systems perspective to training in organizations. Through readings, discussions, in class exercises and project work students will learn to identify organizational issues that can be solved using a training intervention and develop appropriate training. The focus of the course will primarily be on knowledge application. Students will learn about the various steps involved in designing a training program including needs assessment, influence of learner characteristics, transfer of training and training evaluation. Through project work students will gain skills in implementing these steps.
Prerequisite(s): PSYC 221 or PSYC 301
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 456
Engineering Psychology
Theory of human physical and psychological abilities as they relate to design of transportation, housing, workplace, defense and recreational systems. Topics include theories relating to psychophysiology, anthropometry, communications, man-machine interactions, training, maintainability, safety, and engineering evaluation.
Prerequisite(s): PSYC 221
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 460
Child and Adolescent Disorders
This course focuses on the major disorders that are evident in infancy, childhood, and adolescence. A developmental psychopathology approach will be used in which major influences on both normal and abnormal child development will be examined. Students will be exposed to the contextual and socioemotional factors that impact children's development, followed by an in-depth discussion of the various disorders.
Prerequisite(s): PSYC 303
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 462
Behavior Design & User Testing
Behavioral Design examines the interaction of technology with the logically flawed human world. The class will explore why big budget technology solutions, which execute perfectly in development, often fail when put in front of consumers. BJ Fogg said: “The best design solutions today change human behavior”. By understanding User Experience as a measurable set of behaviors, we can apply behavioral sciences like psychology and behavioral economics to the development of technologies. This behavioral perspective helps decrease the probability that the technology solutions you develop do not get lost in the logically inconsistent marketplace that is the human consumer. You'll learn why consumer testing should be conducted early, often, and at every stage of development (even before any code is written). A process you'll learn to love called lean testing.
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 465
Behavior Change Principles and Practice
Students will learn about theories of behavior and apply scientific principles used to promote behavior change. Major topics will include stages of change, motivational interviewing, cognitive behavioral techniques, and contingency management (reward and punishment). Emphasis will be given to altering pathological behaviors and to promoting healthy lifestyle changes in the context of one on one or small group settings.
Prerequisite(s): PSYC 303
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

PSYC 481
Groups and Leadership at Work
The course will review a system's model of groups and will discuss developmental stages of groups as they relate to communication behaviors. It will also review various approaches to leadership including individual, contingency, and relationship. The course engages students in various activities to help them become aware of themselves as team members and team leaders.
Prerequisite(s): PSYC 221 and PSYC 301
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 482
Undergraduate Research Seminar I
An introduction to applied research in psychology. Includes a didactic review of basic and current issues in psychological research as well as an experiential component. Students actively participate in ongoing faculty research programs and are exposed to all areas of research.
Prerequisite(s): PSYC 221 and PSYC 204
Lecture: 1 **Lab:** 2 **Credits:** 3

PSYC 483
Undergraduate Research Seminar II
An introduction to applied research in psychology. Includes a didactic review of basic and current issues in psychological research as well as an experiential component. Students actively participate in ongoing faculty research programs and are exposed to all areas of research.
Prerequisite(s): PSYC 221 and PSYC 222 and PSYC 204
Lecture: 1 **Lab:** 2 **Credits:** 3

PSYC 485
Senior Capstone Project I
The Psychology Capstone Project is an independent study that consists of a formal project and may include a research component, a literature review component as well as a data analysis component or may include an internship or fellowship experience as discussed by you and your project advisor. The project should incorporate and expand upon the depth of knowledge gained from previous years of study and include predetermined deliverables which may include a final thesis or poster. The project should focus on an area of psychology that is of interest to you as a means to expand your knowledge on the subject and to solidify your future goals.
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 486
Senior Capstone Project II
Continuation of the Psychology Capstone Project. This is an independent study that consists of a formal project and may include a research component, a literature review component as well as a data analysis component or may include an internship or fellowship experience as discussed by you and your project advisor. The project should incorporate and expand upon the depth of knowledge gained from previous years of study and include predetermined deliverables which may include a final thesis or poster. The project should focus on an area of psychology that is of interest to you as a means to expand your knowledge on the subject and to solidify your future goals.
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 487
Integrative Psychology Seminar I
A synthesis of issues and areas in psychology. Requires 21 credit hours in psychology.
Prerequisite(s): PSYC 203
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 488
Integrative Psychology Seminar II
Seminar integrating seminal and cutting edge psychological writings both empirical and conceptual to address key issues in contemporary psychology. Requires 24 credits in psychology.
Lecture: 3 **Lab:** 0 **Credits:** 3

PSYC 489
Undergraduate Psychology Seminar
Reports and discussion of current problems and issues in psychology.
Prerequisite(s): PSYC 221 and PSYC 204
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

PSYC 497
Special Problems
Independent study involving compilation and analysis of data bearing on a significant problem. **Instructor permission required.** One credit is earned for approximately 3 hours per week of effort.
Credit: Variable

PSYC 498
Advanced Research
Advanced research for BSMP students.
Lecture: 0 **Lab:** 6 **Credits:** 3

Social Sciences (SSCI)

SSCI 100
Introduction to the Profession
The course introduces students to social science professions, career possibilities, and the range of skill sets utilized by professionals in the field.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 204
States, Markets, and Society
This course examines theoretical explanations for the relationship between governments, society, and the global economy. It considers structural industrial shifts and the impact of technology on production, economic competitiveness and social welfare. Themes include labor value, bureaucratic theory, class conflicts and in the internationalization of capital.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 209
Social Science Research Methods
Introduces students to explanation in the social sciences and both qualitative and the quantitative research methods. Topics covered include the formulation of research questions, measurement, data collection, survey research, significance tests, experimental and quasi-experimental design, sampling, and various techniques of qualitative research.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 210
Social and Political Thought
Examines central social and political theories and their ideas concerning the relationship between individual and society, social harmony and conflict, social equality, and the state.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 220
Global Chicago
Through readings, lectures, and field trips to local neighborhoods, this course will look at the ways that Chicago has become a global city and what that means for local government, businesses, educators, and the non-profit sector. The course explores how Chicago has become a node in the global economy and a gateway to immigrants from all over the world.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 225
Introduction to Geographic Information Systems
This course introduces students to the use of digital geographic information in reasoning about the world. Topics include geographic data collection and management, geographic data models, and basic geographic analysis. A variety of GIS applications will be described across a range of disciplines with an emphasis on geographic problem solving. The social, economic, and legal context of geographic information will also be examined. Principles and concepts will be provided in lectures and reinforced through a series of hands-on exercises.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 285
Special Topics
Investigates a topic of current interest at the introductory level. Course may be taken multiple times provided the topic is different each time.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 318
Global Health
Multidisciplinary course that addresses the most critical issues and initiatives in global health, covering the history of the field and its basic principles and goals, the determinants of health and its links with development, competing perspectives on global health challenges and ways to meet them, the most important causes of disease and death, and the organizations and governance mechanisms that are endeavoring to improve outcomes. The course is geared toward developing theories and methods to understand the social, economic, political, and environmental causes of health outcomes with a focus on disadvantaged communities and health inequalities.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 319
Comparative Health Systems
Surveys and compares health care systems in a range of developed and developing countries. The course examines why countries facing similar health problems have sometimes developed different policy responses, what has been the nature of those policies, and how effective or ineffective they have been. Health insurance, payment methods,the role of providers, the relationship between medicine and culture, and recent reforms and innovations in health care policy are among the topics discussed.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 320
Sociology of Accidents, Disasters, and Security
Accidents and disasters are endemic to complex systems. Security involves the practices employed to mitigate, manage, or defend against them. This course provides critical sociological perspectives on accidents, disasters, and security practices by examining cases which may include nuclear accidents, vulnerability to extreme weather events resulting from social inequality, counter-terrorism practices, "friendly fire" in combat zones, and enhanced surveillance of public and private life.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 321
Social Inequality
Evaluates the patterns and dimensions of social, economic, and political inequality in American society and how these compare with other societies, who gets ahead and why, the consequences of social stratification, and the outlooks for the future of inequality in developed countries like the United States.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 323
Problems of Multi-Ethnic, Multi-Religious States
Focuses on the political challenges arising in multi-ethnic, multi-religious societies in which there has been substantial conflict or balkanization. Developed and developing countries receive attention.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 325
Intermediate Geographic Information Systems
This course builds on introduction to geographic information systems (GIS) and emphasizes GIS spatial modeling skills to solve real world problems. Topics covered include vector and raster data models and conversions, common map algebra functions, surface analysis, 3-D rendering, network analysis, and solve road network problems.
Prerequisite(s): PSYC 203 or SSCI 225
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 354
Urban Policy
Explores major dilemmas facing cities today including changing economic and tax bases, fiscal stresses, immigration, marginalized populations, new forms of consumption, and adaptation to structural change. Responses of politicians to pressures to develop new policies and leverage the productive capacity of the city and the impact of citizen preferences are analyzed.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 355
Regional Economic Development
This course focuses on methods of analyzing why regions differ economically, how they interrelate, and why and how they react to changes in economic policies and conditions. Students will learn about models and metrics of regional structure and growth.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 376
Global Migration
This course will examine the history of migration and present-day situations in Europe, the Americas, the Asia-Pacific region, Africa, and the Middle East including the policies that let some people in but keep others out. Significant attention will also be paid to the process by which foreign "outsiders" become integrated (or not) in their new home. Course draws on research from political scientists, sociologists, demographers, economists, and anthropologists.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 378
Innovation Policy
This course examines government-based attempts to promote innovation. Covered here are the distinctions between “research” and “development” (R&D), the roles states play in guiding specific areas of research, and the rise of the “innovation-based developmental state”. Particularly important for this course are problems relating to green R&D, public and private research coordination, patent policy, and international R&D collaboration. Instructor permission is required.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 380
International Development
This course reviews multidisciplinary perspectives on international development over the last century. It includes a survey of social science theories of development and parallel shifts in the definition of development and development approaches. The role of development stakeholders is also addressed. Topics may include international aid, environmental sustainability, migration, investment, and resources. The course aims to provide students with the necessary knowledge to critically evaluate the successes and failures of current development policies.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 381
Computational Social Science
The social sciences concern with society and the interactions between the individual constituents of society. In this course, students will learn how to develop computational models to explore the social interactions that give rise to wealth inequality, ethnic conflict, and war, as well as to peace, globalization, and the emergence of religions and religiosity. Computational tools offer a promising new approach to gaining insight into the micro foundations of societies and institutions. For example, what human proclivity leads to a stratified community dominated by a small number of influencers each with a large number of followers? How do political attitudes yield social movements, such as mass riots, rebellions, and collective altruism? What role do social networks play in influencing marriage age? The discussions are structured around gaining understanding of social systems as complex entities in which autonomous individuals are the elementary unit of analysis. We will then experiment with the bottom-up framework of agent-based modeling to gain insight on how macro-patterns —racial segregation, cultural norms, and collective actions—arise spontaneously from the interactions of the individuals making up the social system. Nation-states, cities, and markets are adaptive, self-organizing systems of individuals whose interdependent actions are the fundamental building block of our social fabric. Agent-based models (ABMs) are analytically intractable because of the heterogeneous nature of gender identities, lifestyles and other demographic characteristics, which means simulations are the only resort. Class assignments and term paper project will focus on how to extend an existing computer model and interpret the results in the context of compelling social science research investigations. Students in the course will turn in writing assignments that are pieces of the final write-up and get back clarification questions and comments to help revise these for the final, integrated term paper.
Lecture: 3 **Lab:** 0 **Credits:** 3

SSCI 385
Special Topics
Investigates an interdisciplinary topic of current interest in the social sciences. Course may be taken multiple times provided the topic is different each time.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 386
Qualitative Social Science Research Methods
Introduces research methods used in a variety of social science disciplines. Students may explore theoretical and practical issues in research interviewing, ethnographic fieldwork, experiments, conversation analysis, the construction of investigable research questions, data generation and recording, and analytic approaches such as grounded theory and analytic induction. The course combines in-class instruction and workshops with opportunities to apply research methods in on- and off-campus settings.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 387
Fieldwork Methods
This course is designed to provide students with the opportunity to work on a real-world project that is or will be taking place "in the field."
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 388
Methods of Economic Impact Analysis
Students learn methods used by practicing professionals to integrate environmental and social dimensions of policymaking into the framework of economic impact analysis including input-output techniques and social accounting models. Students will learn to use specialized databases and software to quantify the impact of exogenous forces on the U.S. national, state, and local economies.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 389
Urban Planning Analysis
Urban planning plays a critical role in promoting a full and productive life for people around the world; therefore, planners must be able to evaluate the effectiveness of planning responses to particular situations. This course introduces methods for developing and evaluating empirical information in support of urban planning, applying methods widely used by planning and policy professionals.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 422
Complex Organizations
Introduces students to the significant theoretical frameworks that have emerged over time to describe and explain public and non-profit organizations as well as organizational actors and actions. The seminar includes consideration of relations between organization and its environment, the importance of inter-organizational networks, and the role of power in organizational life.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 480
Introduction to Survey Methodology
This course will introduce advanced undergraduate students to the set of principles of survey research design that are the basis of standard practices in the social sciences. The course will discuss how to formulate research questions and develop hypotheses suitable for testing.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 486
Planning, Fundraising, and Program Evaluation
The purpose of this course is to provide students with an introduction to applied research methodologies which are commonly used by public and non-profit managers to assess the effectiveness of service delivery. We will explore the theoretical underpinnings and practical application of the range activities involved in planning, implementing, and evaluating programs.
Prerequisite(s): SSCI 300-399 or PS 300-399 or SOC 300-399
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SSCI 491
Directed UG Research
Students will submit a topic for instructor's approval, conduct research, and complete an original, independent research project regarding spatial distribution of economic activities.
Lecture: 0 **Lab:** 3 **Credits:** 3
Satisfies: Communications (C)

SSCI 493
Public Service Internship
This course is designed to give students in a Social Science major the opportunity to combine classroom theory with practical application through job-related experiences. Students will complete a 120-hour internship with an approved industry, government, or non-profit organization with a work focus which relates to their academic training and career objectives. Instructor permission is required.
Lecture: 0 **Lab:** 3 **Credits:** 3

Sociology (SOC)

SOC 200
Introduction to Sociology
Introduces students to the structure and operation of society. The course analyzes individual behavior and emphasizes social problems.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 208
Social Psychology and Society
Explores different aspects of everyday judgments and their sometimes undesirable social consequences, especially the Fundamental Attribution Error. Other topics include various types of group influences on individual judgment and behavior, as well as persuasion, "brainwashing," helping behavior, and prejudice. Formerly called SOC 308.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 211
Introduction to the Sociology of Space
This introductory sociology course deals with people's general experience of space and how space and spatial arrangements affect people, social interaction, and the sense of community. It is designed to develop knowledge and understanding as well as analytical and perceptive skills. Our experiences of the spatial dimension of reality will be examined from various perspectives: emotional; cognitive; functional; symbolic; and cross-cultural. Our study objects range from everyday experiences to questions of community and city planning. Basic sociological concepts and research methods will be introduced and related to the topics covered. This course is required for SOC 311 (Social Use of Space).
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 250
Introduction to Science, Technology, and Society
The growth of scientific knowledge and technology and the ways in which it has been produced have historically been intertwined with the development of culture and society. The effects are felt in all aspects of human identity and interests: from the ways we live our everyday lives, to our understanding of who and what we are, to the making of political decisions of global proportions. This course prepares students to think critically about the cultures, beliefs, human relationships, and institutions that make and are remade by scientific and technological change.
Lecture: 3 **Lab:** 0 **Credits:** 3

SOC 285
Introductory Special Topics in Sociology
Investigates a topic of current interest at an introductory level. Topic will be announced by instructor at scheduling time. There are no prerequisites for this course. Course may be taken multiple times, provided the topic is different each time.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 301
The Social Dimension of Science
Examines how social and psychological factors influence the reasoning and behavior of scientists. By contrasting traditional views of science with actual scientific practice, the course aims to understand such phenomena as "hype," resistance to scientific discovery, controversy, vicious competition, error, self-deception, and fraud.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 302
Science and Belief
Explores the relationship between science and belief by comparing Western science with other belief systems, science with religion, and science with pseudo-science. The course also examines cultural and ideological influences on scientific knowledge and public faith in science.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 303
Science in Society
Examines the role of the institution of science, scientific knowledge, and scientists in society. The course focuses on areas where science significantly influences and is influenced by political, economic, and cultural institutions and contexts.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 305
Social Communication
Studies the variety of subtle ways, verbal and nonverbal, in which humans communicate in personal, professional, and public life, and how to identify and solve problems and misunderstandings that typically arise. Topics include the social nature of humans, interpersonal communication, interaction within and between groups, teamwork, leadership, and intercultural communication.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 311
Social Use of Space
Gives students basic insights into people's experience of space and the effect of spatial arrangements on people's behavior. The course explores the differences in conceptions between planners and users and the need to take the user into account in spatial design.
Prerequisite(s): SOC 211
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Social Sciences (S)

SOC 322
Sociology of Objects and Technology
Surely technology shapes society. But can society shape technology as well? This course focuses on technologies and technical objects and their intersection with basic sociological themes like social stratification, stability and change, social control, identity, and community. It emphasizes the relationship between the specific properties of technical systems and their social consequences, and examines the complex entwining of social structure and technologies among politics and technologies across many scales.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 348
Deviant Behavior and Conformity
Analyzes the definition, development, and control of deviant behavior in relation to social processes. Societal reaction to and the amount, distribution, and behavioral systems of various forms of deviance (drug addiction, suicide, crime, alcoholism, illegitimacy, etc.) are examined.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 362
Technology and Social Change
Examines the social implications of selected emerging and cutting-edge technologies with an emphasis on recent developments and events. The course investigates the consequences of those technologies for society using both short-term and long-term perspectives and including moral, ethical, socioeconomic, and educational considerations. Same as PS 362.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 385
Topics in Sociology
Investigates a topic of current interest in Sociology which will be announced by the instructor when the course is scheduled.
Prerequisite(s): HUM 200-299
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

SOC 491
Undergraduate Research in Sociology
Working with a member of the sociology faculty, students will choose a topic, conduct research, and complete an original, independent research project.
Prerequisite(s): SOC 300-399 and SOC 190-299
Credit: Variable
Satisfies: Communications (C)

SOC 497
Directed Readings
Consists of independent reading or analysis, centered on particular problems and supervised by a member of the Sociology faculty. Credit: Variable; maximum 3 credit hours.
Prerequisite(s): SOC 300-399 and SOC 190-299
Credit: Variable
Satisfies: Communications (C), Social Sciences (S)

SOC 498
Exercises in Behavioral Observation
Provides students with an opportunity to acquire better field-work skills by providing a forum for discussing and practicing the craft. This is a seminar in advanced ethnographic methods. Permission of instructor is required.
Lecture: 3 **Lab:** 0 **Credits:** 3
Satisfies: Communications (C), Social Sciences (S)

Technology (TECH)

TECH 210
English Studies -- Cultural Enrichment
This course is designed to introduce international students to Chicago and American culture while providing opportunities to improve English communication and conversational skills. The course will consist of classroom lectures, discussions, and cultural excursions to events and famous sites in Chicago. English language strategies learned in class will be reinforced by field trips, discussions, structured listening and speaking activities, and readings involving current topics. The course will provide students with real-world opportunities to practice English and enjoy cultural outings.
Lecture: 2 **Lab:** 0 **Credits:** 2

TECH 310
Language Lab
This course is designed to introduce international students to the sound system of North American English (NAE). Students will develop skills to improve pronunciation, fluency, and grammar through a combination of instructor-led activities and computer-based software.
Lecture: 1 **Lab:** 1 **Credits:** 1

TECH 465
Introduction to Social Commerce
Provides an introduction and basic knowledge of social commerce to help students develop a practical understanding of the design, construction, market readiness, and synergistic integration of a business mobile application. The course will provide a practitioner focus that will benefit students in a start-up or company/corporate setting.
Lecture: 3 **Lab:** 0 **Credits:** 3

TECH 497
Special Projects
Independent study and projects in applied technology that are multi/cross-disciplinary not tied to a specific department.
Credit: Variable

ACADEMIC POLICIES AND PROCEDURES

Academic Honesty

Illinois Institute of Technology expects students to maintain high standards of academic integrity. Students preparing for the practice of a profession are expected to conform to a code of integrity and ethical standards commensurate with the high expectations society places on practitioners of a learned profession. No student may seek to gain an unfair advantage over another. The Code of Academic Honesty is explained in the university's Student Handbook and all students are expected to know and adhere to this code.

Advising and Academic Progress

Academic Program Audit

An academic audit provides a summary of a student's academic status to date and lists the courses to be completed in order to receive a degree. Students can request an official academic audit from the Office of Undergraduate Academic Affairs after they have earned a minimum of 60 credit hours (90 credit hours for architecture students) and have completed at least one semester at Illinois Institute of Technology. Students may request an official academic audit through the Undergraduate Academic Affairs channel in the MyIIT portal (my.iit.edu) or via the UGAA website (iit.edu/ugaa).

Students may also review academic progress towards their degree through Undergraduate Degree Works in the Undergraduate Academic Affairs channel in the MyIIT portal. **Please note that Degree Works is not an official report for academic progress.**

Academic Progress, Probation, and Academic Suspension/ Dismissal

All students who are degree candidates are expected to maintain satisfactory academic progress. This includes earning satisfactory grade point averages (GPA) and maintaining a satisfactory rate of progress toward the completion of their degree programs.

Students who earn less than a 2.00 cumulative GPA, a 1.85 current term GPA, or a 2.00 major GPA are placed on academic probation.

Degree-seeking students are required to maintain a satisfactory rate of progress:

- Full-time students must earn a minimum of 12 credit hours per semester applicable to their degrees.
- Part-time students must maintain a satisfactory rate of progress which will enable them to graduate within 12 academic years after achieving degree-seeking status.

Students who do not maintain a satisfactory rate of progress in a given semester may be placed on probation based on the recommendation from the student's academic adviser, department associate chair, or academic dean. Probation may affect financial aid. See Student Eligibility Requirements to Receive Federal and State Financial Assistance in the Financial Aid section (p. 13).

Students on probation are not permitted to:

- Register for more than 15 credit hours per semester unless they receive approval from the associate dean of their college.
- Hold an elected or appointed office in any student organization. Probation does not affect membership in a student organization.
- Participate in the Cooperative Education Program unless approved by the Academic Standing Committee.

Academic probation may affect a student's eligibility to participate in varsity athletic sports.

Students who are enrolled in a dual degree program and are placed on academic probation must schedule a meeting with the Office of Undergraduate Academic Affairs.

Students who are on academic probation for two consecutive semesters are candidates for academic suspension from the university.

The progress of non-degree students also is reviewed and any student who does not maintain good academic standing is subject to being placed on probation or academic suspension.

A student placed on academic suspension by the university may petition the Academic Standing Committee to review the suspension. The student must present substantial academic or other relevant new evidence not available at the time of suspension in support of the petition for reinstatement. The chair of the Academic Standing Committee will determine whether the new documentation warrants a further review of the case.

Advising

Each undergraduate student is assigned a faculty academic adviser who is available to discuss opportunities and career plans in the student's chosen field and to plan and approve coursework to meet departmental and university requirements. Students are urged to consult their advisers when questions arise.

Department advisers, the director of undergraduate advising, and advisers in the Office of Undergraduate Academic Affairs are also available to answer questions and interpret policies regarding university requirements and academic procedures.

Change of Major or Declaration of Additional Majors

Students considering either a change of major or concurrently pursuing a second undergraduate degree or major should consult the departmental associate chair regarding program requirements and career opportunities in the new degree program.

Students may also review requirements for the new degree program by performing a "What If" audit using Degree Works. Students may access Undergraduate Degree Works through the Undergraduate Academic Affairs channel in the MyIIT portal (my.iit.edu).

An adviser in the Office of Undergraduate Academic Affairs can also assist a student in the selection of a suitable major. A student who wishes to change or declare a major or concurrently pursue an additional undergraduate degree program must submit a form through the Office of Undergraduate Academic Affairs or at web.iit.edu/ugaa/services/change-declare-major. Approval from the intended major department is required.

Change of Status

Students who wish to change a classification and/or registration status must complete the applicable procedures listed below no later than two weeks prior to registration.

- Students changing from full-time degree-seeking status to part-time degree-seeking status must notify the Office of Financial Aid if they are receiving financial aid. International students with student visas must be registered as full-time students and are not permitted to change to part-time status.
- Students changing from part-time degree-seeking status to full-time degree-seeking status must inform their department and obtain the necessary adviser's approval for a full-time course load. Also, students in this category who wish to apply for financial aid must notify the Office of Financial Aid regarding their change of status.
- Students changing from non-degree status to full-time or part-time degree-seeking status must contact the Office of Undergraduate Academic Affairs. Students must have completed at least one semester of relevant coursework at the university and must be in academic good standing in order to be eligible for changing their status.
- Students changing from graduate status to undergraduate full-time or part-time status must submit an application for reinstatement to the Office of Undergraduate Academic Affairs.

Second Bachelor's Degree

A student whose first degree is granted by Illinois Institute of Technology must complete a minimum of 15 additional credit hours for a second bachelor's degree at the university. A student whose first degree was awarded by another institution must complete a minimum of 45 additional credit hours at the university. All other graduation requirements apply for the second degree.

Credit by Examination

Credit may be earned through the following examination procedures. Total credit from proficiency examinations and the College Level Examination Program may not exceed 18 credit hours. There is no limit for Advanced Placement (AP) or International Baccalaureate (IB) credit.

College Level Examination Program (CLEP)

For these examinations, which are administered by the College Entrance Examination Board, Illinois Institute of Technology will award credit under the following conditions:

- The CLEP examination and the score achieved meet the standards of the university department that offers courses in the area of the examination
- The CLEP examination is not allowed for courses in which the student has previously enrolled and must be completed before a student's final 45 credit hours of enrollment at the university
- Students must observe all rules of the College Level Examination Program regarding the taking of CLEP examinations

Note: Previous acceptance of the examination by another institution does not imply acceptance by Illinois Institute of Technology.

Proficiency Examinations

Any student who believes that, through self-study or outside experience, they have gained the substantive equivalent of the content of a specific course, may ask for an examination. With the approval of the chair of the department offering the course and the Office of Undergraduate Academic Affairs, a proficiency examination will be administered. This is a graded exam and the letter grade will be entered on the permanent record. Proficiency examinations are not allowed for courses in which the student has previously enrolled and must be completed before a student's final 45 credit hours of enrollment at the university. The Credit by Examination Form may be obtained in the Office of the Registrar and a per-credit-hour fee is charged for each examination.

Grades and Transcripts

Grades

Grade	Grade Description	Instructor Assigned	Performance Evaluation	Attempted Hours	Earned Hours	Quality Points	Quality Hours	GPA Hours	FinAid Hours
A	excellent	x	x	x	x	4.00	x	x	x
B	above average	x	x	x	x	3.00	x	x	x
C	average	x	x	x	x	2.00	x	x	x
D	below average	x	x	x	x	1.00	x	x	x
E	fail	x	x	x		0.00	x	x	x
I	incomplete	x		x		0.00			x
R	research	x		x		0.00			x
NA	non-attendance	x		x		0.00	x	x	x
NG	non-graded					0.00			
P	pass	x	x	x	x	0.00			
F	fail	x	x	x		0.00			
S	satisfactory	x	x	x	x	0.00			x
U	unsatisfactory	x	x	x		0.00			x
TR	transfer course				x	0.00			
AU	audit					0.00			
W	withdrawal			x		0.00			x
X	no grade submitted			x		0.00			x

Grade Notes

AU	Grade basis elected by student at point of registration. Permanent administrative grade automatically applied.
D	Used for undergraduate and Stuart School of Business students only; not to be used for other graduate level course work.
I	Temporary grade requested in writing of the instructor, by the student, prior to week of finals. Automatically posted when the Registrar's Office receives the approved request. A written agreement between the student and instructor must detail the remaining requirements for successful completion of the course. A grade of "I" will be assigned only in case of illness or for unusual or unforeseeable circumstances that prevent the student from completing the course requirements by the end of the term. Grades of "I" will automatically lapse to "E" on the published deadline of the subsequent term.
R	Temporary grade indicating coursework is scheduled to extend beyond the end of term. Grade of R has same impact as grade of I until final letter grade is submitted. Does not expire or change to another grade.
NA	A grade of "NA" indicates an apparent withdrawal as a result of the student never attending a registered section. For graduate courses, the "NA" grade was designated as a final grade equivalent to a failing grade of "E" and calculated in the graduate cumulative GPA through Summer 2015. The designation changed in Fall 2015 by which the "NA" grade is a midterm grade only and, therefore, does not impact the graduate cumulative GPA. For undergraduate courses, the "NA" grade was designated as a final grade equivalent to a failing grade of "E" and calculated in the undergraduate cumulative GPA through Fall 2012. From Spring 2013 to Summer 2015, the "NA" grade retained its designation as a final grade but had no impact on the undergraduate cumulative GPA. The designation changed in Fall 2015 by which the "NA" grade is a midterm grade only and, therefore, continues to have no impact on the GPA.
NG	Grade basis for a course in which no evaluation is recorded. Permanent administrative grade automatically applied.
P/F	Used for non-degree, continuing education training courses. Continuing Education Units (CEUs) are graded on a Pass/Fail basis only.
S/U	Pass/Fail grade basis used for select undergraduate and graduate academic courses. Not applicable to variable topics courses.
W	Permanent administrative grade automatically applied when student withdraws before deadline (60% of term).
X	Temporary administrative grade automatically applied when instructor fails to submit final grade by deadline.

Grading Procedure

Online submission of final grades are due on the published deadline following final exams. Grades of "X" are posted for all missing (blank) grades at that time and are resolved through the grade change process. All grade changes are initiated by the instructor of record or authorized academic officer. Current temporary grades of "I", "R", and "X" can be changed by the instructor directly with the Office of the Registrar to a final letter grade of: "A", "B", "C", "D", "E", or "S/U", if the class has a pass/fail grading basis of satisfactory/unsatisfactory. Temporary grades of "I" or "R" cannot be changed to another temporary or a non-letter, administrative grade of: "I", "R", "NA", "AU", "W", or "X". Other grade changes may require an additional level of approval by an academic officer or appeals committee.

Assessment of Student Academic Progress

Throughout the course of each semester, students should receive timely and substantive assessments from their courses' instructors regarding their academic progress and grades. Students who feel that their instructors do not provide adequate feedback may seek redress from their respective academic unit's chairperson and/or college dean.

Grade Point Average

The grade point average (GPA) is determined by dividing the total number of grade points earned by the total number of graded credit hours. Graded credit hours include courses graded "A", "B", "C", "D", and "E". All courses taken at Illinois Institute of Technology apply to the cumulative GPA, including those courses that do not apply toward graduation requirements for a degree program.

Course Repeat Policy

Undergraduate students may request to repeat a course and must submit the request through Undergraduate Degree Works (available in the Undergraduate Academic Affairs channel of the MyIIT portal) by using the petition tab. This request should be made after a student registers for the course the second time. The course repeat policy is as follows:

- A maximum of three 100- and 200-level courses may be repeated. A maximum of three 300- and 400-level courses may be repeated. Course repeats not used for 100- and 200-level courses cannot be carried forward to 300- and 400-level courses.
- Both grades will be recorded on the official transcript.
- Both the grade and credit hours from the first course will be removed from a student's GPA calculation.

- Only the second grade will be used to compute the GPA, even if the second grade is lower, except when the second grade is "I", "R", "S", "U", "W", "X", or "AU".
- A repeated course must be taken within one calendar year after initial enrollment in that course or the next time the course is offered (whichever is longer).
- The same course may be repeated only once.
- If a course is no longer offered by the university, the provision to repeat the course does not apply.
- Repeating a course when the first grade is a "C" or "B" requires the approval of a student's faculty adviser.

Taking a Course for Pass/Fail

Undergraduate students may take a maximum of three courses as Pass/Fail, provided that any such course meets the following criteria:

1. The department offering the course has designated it as eligible for the Pass/Fail option.
2. The course is:
    - A free elective within the student's major program, or
    - Designated as eligible for Pass/Fail grading by the academic unit or other authority which oversees the student's major and/or minor programs, or
    - A course taken above and beyond all of the student's program requirements for graduation.

If a student takes a course as Pass/Fail, an "S" or Pass grade will be earned for the equivalent of a standard grade of "A", "B", "C", or "D", and will not figure into GPA calculations. A Fail will be entered as the standard grade of "E", and will figure into GPA calculations. Students must declare their intention to take a course Pass/Fail by the end of the registration period. A course taken initially as Pass/Fail may only be repeated for a grade change as Pass/Fail; likewise, a course taken initially as a standard graded course may only be repeated for a change of grade as a standard graded course. For more information on Pass/Fail registration, visit the Office of the Registrar website (web.iit.edu/registrar).

Grade Appeal

The assignment of letter grades (see Grades (p. 436)) is at the discretion of the course instructor, and except for unusual circumstances, the assigned course grade is final.

Undergraduate students who want to appeal a letter grade assigned in a course should first confer directly with the course instructor. If the student and instructor cannot come to an agreement, the student should contact the chair of the instructor's department. If necessary, the student can appeal to the dean of the instructor's college.

Dean's List

Every semester the names of all undergraduate students who have completed at least 12 graded credit hours with a minimum semester GPA of 3.50 appear on the Dean's List.

Transcripts

Official transcripts are requested through the Office of the Registrar and are only released with the consent and authorization of the student, in compliance with the Family Educational Rights and Privacy Act of 1974 (FERPA). The secured document is certified as of the printing date and is not valid if altered in any way or opened by someone other than the intended recipient.

Official transcripts are released only when holds on accounts are cleared. Official transcripts are either mailed, sent electronically (PDF), or made available for pickup by the student. Official transcripts issued directly to the student making the request are stamped "ISSUED TO STUDENT." A fee is charged for each transcript issued.

The Office of the Registrar does not provide unofficial transcripts. Students and alumni may access their unofficial transcripts through the MyIIT portal in Banner Self Service.

For more information, visit web.iit.edu/registrar/transcripts.

Graduation

Every student is responsible for fulfilling graduation requirements as specified in the Illinois Institute of Technology Bulletin in effect at the time of their admission to the university. If those curriculum requirements change before the student completes a specified degree program, the student may follow a curriculum in a subsequent Bulletin with the approval of their academic unit head.

The student has the ultimate responsibility to fulfill degree requirements, to attain eligibility to enroll in particular courses, and to comply with all applicable academic rules governing their academic program.

Note: Students must file an Application for Graduation Form at the beginning of the semester in which they plan to graduate. A late fee will be charged to students who submit an application after the posted deadline. Please refer to the Academic Calendar (p. 5) for specific deadlines.

Undergraduate students must successfully complete:

- All required courses in their major program
- Credit hour requirements as appropriate to their major (a minimum of 126 credit hours)
- Core Curriculum (p. 24) and special academic requirements
- Residence requirements (p. 441)
- A minimum cumulative GPA of 2.00 and a minimum major GPA of 2.00. A student who completes all course requirements with an average below the minimum grade point requirements may, with permission of their department chair and academic dean, take additional courses to raise the GPA.
- Completion of all the above within a period of eight calendar years from the semester of initial admission for full-time students or 12 calendar years for part-time students after achieving degree-seeking status. A student may petition their major department and academic dean to have this period extended. If the petition is approved, this extension may involve additional compensating academic requirements.

All incomplete coursework must be submitted to the instructor prior to the date of graduation. A recorded grade of "I" (incomplete) in a course required for graduation will result in deferral of that student's graduation until the next semester. A new application for graduation must be submitted for that semester.

Students will not receive their diploma(s) or transcript(s) until all financial obligations to the university have been met.

Graduation with Honors

A student must complete a minimum of 60 graded credit hours at Illinois Institute of Technology in order to receive the award of summa cum laude, magna cum laude, or cum laude. A student who has a GPA of 3.85 and higher will graduate with summa cum laude honors; a student who has a GPA between 3.70-3.849 will graduate with magna cum laude honors; and a student who has a GPA between 3.50-3.699 will graduate with cum laude honors. Only Illinois Institute of Technology courses are factored in a student's GPA.

Leaves and Withdrawals

Leave of Absence

Undergraduate degree-seeking students who need to withdraw from the university with the intention of returning and completing their degree program may apply for a leave of absence. This request is made through the Undergraduate Academic Affairs channel in the MyIIT portal (my.iit.edu). All requests for a leave of absence will be reviewed by the Office of Undergraduate Academic Affairs, and requests must be submitted by the last day to withdraw for full semester classes, as published in the Academic Calendar. The leave will take effect in the current semester. Any request submitted after the last day to withdraw will take effect the following semester. A leave of absence cannot exceed one academic year and can be extended if appropriate documentation is submitted.

International students must comply with additional regulations when requesting a leave of absence. See iit.edu/international-center for additional details.

Return from Leave

Students returning from a leave of absence must submit an application for reinstatement to the Office of Undergraduate Academic Affairs. The deadlines for reinstatement are June 15 for the fall semester, November 15 for the spring semester, and April 15 for the summer term.

Students returning from a medical leave of absence are required to submit appropriate documentation from their medical provider. Contact the Office of Undergraduate Academic Affairs for more information.

Students who were on academic probation when they stopped attending Illinois Tech will be reinstated on probation if their application is approved. These students must submit a personal statement with their application. This statement should explain past performance and outline an academic plan for future success. In these cases, the application will be reviewed by the major department. Contact the Office of Undergraduate Academic Affairs for more information.

Students who wish to change their major must adhere to all university policies for a change of major. If a student took courses at another college or university during a leave, official transcripts must be sent to the Office of Undergraduate Academic Affairs.

International students must contact the International Center after being reinstated to the university.

Withdrawal from the University

Undergraduate degree-seeking students who wish to withdraw from the university must contact the Office of Undergraduate Academic Affairs to schedule an exit interview which is required to begin the official withdrawal procedure. Students need to apply for a withdrawal through the Undergraduate Academic Affairs channel in the MyIIT portal (my.iit.edu) and this must be done by the end of the 12th week of the semester for the withdrawal to take effect that semester. Any request submitted after the 12th week will take effect the following semester; however, exceptions can be made due to special circumstances.

International students must comply with additional regulations when withdrawing from the university and must contact the International Center.

If a student reconsiders the withdrawal, written notification to the Office of Undergraduate Academic Affairs is required.

Please note that non-attendance is not an official withdrawal from the university.

Reinstatement

All undergraduate students who were not in attendance for at least a semester must submit an application for reinstatement to the Office of Undergraduate Academic Affairs. The deadlines for the application are June 15 for the fall semester, November 15 for the spring semester, and April 15 for the summer term.

Applications for reinstatement will not be reviewed until all financial obligations to the university are satisfied.

If a student took courses at another college or university during their time away from Illinois Institute of Technology, official transcripts must be sent to the Office of Undergraduate Academic Affairs. The application will not be reviewed until all official transcripts are received.

Students who were on academic probation when they stopped attending Illinois Tech will be reinstated on probation if their application is approved. These students must submit a personal statement with their application. This statement should explain past performance and outline an academic plan for future success. In these cases, the application will be reviewed by the major department. Students who wish to change their major must adhere to all university policies for a change of major. Contact the Office of Undergraduate Academic Affairs for more information.

Petitions

A student may request a review of decisions concerning academic status or regulations by submitting an academic petition to the Office of Undergraduate Academic Affairs. Students who wish to take a course at another institution during the summer must submit a Transfer Credit Petition Form to the Office of Undergraduate Academic Affairs prior to the registration at another institution to guarantee transfer of credit in accordance with university policies.

Registration

Registration and Class Attendance

Students are required to be registered for all classes in which they participate, attend, and/or submit coursework for evaluation. No credit will be granted for any course for which the student did not properly register before the last day to add a class for the semester. Students are required to be registered to make use of university facilities. Students who are in an exchange, study abroad, or cooperative education program also must be registered for their particular programs.

All students are expected to attend classes regularly. Excessive absences may be grounds for a failing grade. Non-attendance does not constitute an official withdrawal. When illness or emergency requires a student to miss more than two days of class, the student must notify the course instructor. It is also recommended that the student contacts the Dean of Students and the Office of Undergraduate Academic Affairs.

Priority Registration

Students are allowed to register for an upcoming term based on their student classification (p. 441), which is determined by earned credit hours. In-progress credit hours are not used in determining registration priority. Visit web.iit.edu/registrar or kentlaw.iit.edu/current-students for more specific information.

Registration Holds and Controls

Students with unpaid balances, disciplinary sanctions, unmet immunization requirements, or other such conditions that warrant a registration hold are prevented from enrolling in classes until the condition is resolved and the hold is removed.

Registration controls including prerequisites, corequisites, maximum hours, level, and program restrictions may also exist to limit or prevent registration in specific circumstances. Students should consult their adviser, resolve all holds, and take note of any registration restrictions that pertain to their student status and course selection prior to their appointed registration date for an upcoming term.

For more information, go to iit.edu/registrar/registration.

Academic Loads

The average full-time academic load during the fall or spring semester is 15 credit hours. The minimum registration required for full-time status for those semesters is 12 credit hours. Full-time degree-seeking students who wish to enroll for more than 18 credit hours or part-time degree-seeking students who wish to enroll in nine to eleven credit hours must obtain permission from their academic dean.

Students who wish to enroll in more than two courses during the summer term at Illinois Institute of Technology must obtain permission from their academic dean.

Non-degree students requesting a course overload (more than eight credit hours) must obtain permission from the Office of Undergraduate Academic Affairs.

Graduate Course Enrollment Approval

All undergraduate students who wish to enroll in a graduate 500-level course must obtain approval from their faculty adviser. All undergraduate students who enroll in graduate courses are governed by the graduate grading system for those courses. Please note that not all graduate courses can apply towards undergraduate requirements. Students must verify the course can apply towards undergraduate requirements prior to registering.

Residence Requirements

All undergraduate degree-seeking students must observe the following residence requirements:

- Once enrolled at Illinois Institute of Technology, a student is not permitted to enroll at another institution without obtaining permission. A student must submit an academic petition to the Office of Undergraduate Academic Affairs for approval prior to registration at another institution.
- A course failed at Illinois Institute of Technology can only be repeated at Illinois Institute of Technology. No transfer credit will be awarded for any course equivalent to a course failed at Illinois Institute of Technology.
- The final 45 semester hours of work must be completed in residence at Illinois Institute of Technology. Any proficiency examinations or enrollment at another institution must be completed before this period.
- A student must complete a minimum of 45 semester hours at Illinois Institute of Technology in order to be eligible for a bachelor's degree from Illinois Institute of Technology.

Student Classification

The following table describes classifications for undergraduate students currently in effect at the Illinois Institute of Technology. Classification is based on total earned hours in a student's undergraduate career.

Classification	Earned Hours
First-Year Undergraduate (U1)	0-29.9
Second-Year Undergraduate (U2)	30-59.9
Third-Year Undergraduate (U3)	60-89.9

Fourth-Year Undergraduate (U4)	90-130.9
Fifth-Year Undergraduate (U5)	131+

Unit of Credit

Illinois Institute of Technology complies with the federal definition of the credit hour which states that a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

Campus Resources

Academic Resource Center

Hermann Hall, Room 112
312.567.5216
arc@iit.edu
iit.edu/arc

The Academic Resource Center (ARC) is a comprehensive center with a variety of services for students and faculty. The ARC's mission is to enrich the academic experience through a student-centered approach to learning. The ARC provides peer tutoring in mathematics, architecture, engineering, and the sciences on a drop-in basis and by appointment.

Undergraduate and graduate peer tutors are available during the fall, spring, and summer semesters. In addition to peer tutoring, the ARC also offers exam reviews, workshops, supplemental instruction, peer advising, group study space, and an OTS computer laboratory, including PCs and Macs. Additionally, the ARC keeps some textbooks and iPads with academic apps for reference. The tutoring schedules are available online and students can make an appointment utilizing the TutorTrac system (tutortrac.iit.edu).

The peer ARC Scholars will assist with academic software, such as: Java, Javascript, Excel, SPSS, MATLAB, Mathematica, AutoCAD and more. The ARC's focus is towards undergraduate courses at Illinois Institute of Technology. Graduate students can also use the ARC's user-friendly space, printers, scanner, and computers.

The ARC is open Monday through Thursday, 10 a.m.–8 p.m.; Friday, 10 a.m.–3 p.m.; and Sunday from 6 p.m.–9 p.m. For more details, visit the ARC website or call 312.567.5216.

Access, Card, and Parking Services

Hermann Hall, Room 201
312.567.8968
acaps@iit.edu
iit.edu/acaps

Access, Card, and Parking Services (ACaPS) is the home of the HawkCard. The HawkCard is the photo identification card for Illinois Tech students, faculty, and staff. It also grants access to buildings, parking lots, computer labs, Keating Sports Center, library services, resident meal plans, and TechCash balances. Students can check their meal plan balances, add TechCash, and report their HawkCard lost online via MyHawkCard. Parking permits are available for purchase online via MyParking. Visit the ACaPS Office in Hermann Hall, Room 201 or contact the team at 312.567.8968 or acaps@iit.edu with any questions.

Athletics and Recreation

Keating Sports Center
312.567.3242
illinoistechathletics.com

Intercollegiate Athletics

Illinois Institute of Technology is a full member of NCAA Division III for all varsity sports. The university offers the following intercollegiate sports: men's and women's soccer, men's and women's cross country, men's and women's basketball, men's and women's volleyball, men's and women's swimming and diving, men's and women's tennis, men's and women's indoor track and field, men's and women's outdoor track and field, men's and women's lacrosse, and baseball.

As a member of NCAA Division III, Scarlet Hawk student-athletes have the opportunity to face strong competition from other Division III members. Illinois Tech is a member of the Northern Athletics Collegiate Conference (NACC) in all sponsored sports except men's and women's swimming and diving.

The Illinois Institute of Technology's men's and women's swimming and diving programs compete in the Liberal Arts Conference.

Recreational Sports and Fitness

The department is committed to the well-being of the campus community through fitness activities and healthy competition. Programs are designed to make a positive contribution impacting personal, physical, ethical, and social development of the general student population.

Healthy and active lifestyles are also promoted through a varied menu of fitness classes, which are suggested by students. These range from high intensity interval training and hip hop dance classes to other popular activities. New classes are introduced each semester in order to provide maximum choice and variety for the student body.

Informal recreation and fitness activities on campus are also encouraged. Open swimming, the fitness center, and open gym in Keating provide students with drop-in options for activity. Illinois Institute of Technology has the only disc golf course in the city of Chicago, making the campus a popular destination for local disc golf enthusiasts.

Campus Life

McCormick Tribune Campus Center, Room 208
312.567.3720
/web.iit.edu/campus-life/about-us

The Office of Campus Life provides campus programs and events designed to enhance the student educational experience outside of the classroom. The Office of Campus Life manages new student orientation (SOAR), first year experience programming, and student leadership development and supports spiritual and diversity-related programming. In addition, it also provides direct oversight to more than 150 student organizations, including the Student Government Association and Union Board. Other registered student organizations (found at hawklink.iit.edu) represent a variety of student interests in areas such as culture, recreation, academics, and the arts.

Career Services

Hermann Hall, Suite 113
312.567.6800
careerservices@iit.edu
web.iit.edu/career-services

Career Services is an on-campus resource for professional development and career planning. This office provides the following services to students and alumni:

- one-on-one and small group advising with career development coaches and peer career coaches
- reviews of résumés, cover letters, LinkedIn profiles, and other career-related documents
- professional development workshops for the general campus community and for specific student or alumni groups
- access to career development technology resources such as our internal job posting board, Handshake
- career fairs and other recruitment or networking events to engage with employers

This office serves all current students and alumni from the following colleges/campuses: Armour College of Engineering, College of Architecture, College of Science, Institute for Food Safety and Health, Lewis College of Human Sciences, and the School of Applied Technology. More information is available on the Career Services website. Separate career support offices exist for the Institute of Design, Stuart School of Business, and Chicago-Kent College of Law.

Center for Learning Innovation

The Center for Learning Innovation is the bridge between academics and technology and addresses the evolving needs and challenges of the learning environments at Illinois Tech. Center staff have years of experience helping faculty with online and in-person course instruction. The Center's core mission is to work with faculty to promote active learning in face-to-face, blended, or online courses. Using instructional design principles and educational technology, the Center partners with faculty and departments to create enriching learning experiences and improve learning outcomes for all Illinois Tech students. The Center support touches all facets of student academic experiences from initial instructional design and pedagogy to production and delivery of course content, management of exams for remote students, and more. The Center for Learning Innovation also administers online courses and programs.

BLACKBOARD

Illinois Tech uses Blackboard Learn as its learning management system (LMS). Every course at Illinois Tech has a corresponding course shell in Blackboard.

The Center for Learning Innovation manages day-to-day operations of Blackboard and provides faculty training and support. The majority of Illinois Tech faculty use Blackboard Learn. Many post their course syllabus and other course content in their course shell. Illinois Tech also uses Blackboard Collaborate Ultra. Collaborate Ultra is a web video conferencing tool that allows instructors to share audio and video, applications, and files. Instructors can either hold a synchronous course—with all students in attendance at the usual course date and time—or an asynchronous course, with students accessing the material at any time.

Please note that utilization of the LMS or any of its specific features in a particular course or course shell is entirely dependent upon the department or instructor teaching that particular course. Students with questions about Blackboard Learn or Blackboard Collaborate Ultra and their features should contact the Support Desk.

ONLINE COURSES AND PROGRAMS

The Center for Learning Innovation supports departments in the design, delivery, and administration of Illinois Tech online courses and programs. For specific details regarding a particular online course or program, the best source of information will always be the department that offers the particular course or program.

Prospective students who wish to take online courses or programs must first be admitted to a degree, certificate, or professional development program. Students in online courses or programs are Illinois Tech students and are subject to the same policies and procedures as on-campus students in face-to-face courses.

Most online program and course offerings are at the graduate level. Courses follow the same 16-week semester as the university academic calendar. Courses typically have the same faculty and follow the same syllabus. Course structure and delivery vary, depending on the instructor. In many cases, online course content is created using recorded lectures of the corresponding face-to-face course. Recordings are typically made available in Blackboard within a few hours of the face-to-face-session. Online and face-to-face course sections may share a Blackboard course shell, yet the sections are distinct; students enrolled in online sections are not counted when considering room assignments for courses or exams. If a course holds exams, exams follow the same university exam schedule. Exams for remote students are coordinated through the Center for Learning Innovation. Proctored exams are typically administered online or at local testing centers. Students are responsible for any additional third party fees associated with taking exams online or at testing centers. Such fees may vary widely depending on the provider selected.

Communication Across the Curriculum Program

iit.edu/cac

The Communication Across the Curriculum (CAC) Program helps students understand the role of writing and speaking in their academic and professional lives. Both on its website (iit.edu/cac) and through the Illinois Tech Writing Center (p. 452), located in Siegel Hall 232/233/234, the CAC provides assistance in communication skills for academic inquiry, professional research, and the workplace. The CAC assists instructors in developing materials relevant to written, oral, electronic, and interpersonal communication in discipline-specific courses—particularly Introduction to the Profession (ITP), communication-intensive courses (C-courses), and Interprofessional Projects (IPROs). The CAC also periodically reviews all C-courses in each academic unit to ensure that they meet the university's standards for such courses. Finally, the CAC also administers the university's Basic Writing Proficiency requirement.

Commuter Student Services

Illinois Institute of Technology's commuter student organization, the Commuter Student Association, informs commuter students about available student services and serves as a place where commuter students get to know one another and voice their concerns. The group also plans a variety of events and activities throughout the year. The Bog, located in the lower level of Hermann Hall, is home to the Commuter Lounge during the weekdays. For more information on CSA's programming, students should contact the Office of Campus Life.

Disability Resources

10 W. 35th Street, Suite 3F3-1
312.567.5744
disabilities@iit.edu
iit.edu/cdr

Services for people with disabilities are coordinated by the Center for Disability Resources (CDR). People with disabilities who are interested in applying for admission to any of the university's academic programs are invited to call 312.567.5744 or email disabilities@iit.edu prior to their arrival on campus to discuss their individual needs. Enrolled students with disabilities are encouraged to contact the Center for Disability Resources to register and request accommodations.

English Language Services

IIT Tower, 4th Floor
10 West 35th Street
312.567.5220
els@iit.edu
english.iit.edu

The mission of English Language Services at Illinois Institute of Technology is to provide engaging English language instruction in a dynamic learning environment relevant to the academic and professional needs of non-native learners.

English Language Services offers several options for students to develop their language abilities. To view more information about the English Language Services department and what they offer, please visit english.iit.edu. English Language Services is accredited by CEA (the Commission on English Language Program Accreditation), and under the university through the Higher Learning Commission (HLC), and is licensed to operate under the Illinois Board of Higher Education.

To view information about specific programs and courses, please visit the Language Courses section of this bulletin. Programs include:

- Intensive English and Pathway Program
- English Language Program (commonly referred to as PESL)
- Professional Communication Advancement
- English for Design

English Language Services also offers special programs/courses for visiting groups as well as individuals who want to study part-time. Contact us at els@iit.edu to find out more.

Fraternity and Sorority Life

iit.edu/greek_life

The Greek community at the university is focused on giving students the chance to learn both inside and outside of the classroom. The university's seven fraternities and two sororities uphold their own missions through brotherhood and sisterhood activities. These groups also concentrate heavily on the values of their organizations by participating in regular philanthropic and community service events. Each fraternity and sorority has its own operating structure and allows students to develop valuable leadership and interpersonal skills. Academics and scholarship are an integral part of the Greek system, and the community works hard to uphold rigorous scholastic standards as a part of their daily functioning. Membership is open to both residential and commuter students.

Graduate Academic Affairs

IIT Tower, Suite 7D7-1
312.567.3024
gradcoll@iit.edu
web.iit.edu/gaa

The Office of Graduate Academic Affairs (GAA) is responsible for the implementation and enforcement of graduate academic policies, the completion of academic standing reviews, degree audits and degree conferrals, communication with and counseling of graduate students, and the identification of campus resources, as appropriate to graduate student needs.

Services provided by this office include the review and approval of requests for transfer credit; change of degree and major; declaration or change of specialization, project, and thesis option; approval of master of science and doctoral examination results; acceptance of the application for graduation, certification of the graduate degree; completion of the academic probation meeting; approval of an official leave of absence or official withdrawal from the university; and reinstatement of a former student to graduate study. Graduate Degree Works, the online degree audit system is monitored and maintained by GAA.

Note: The Graduate College (GC) reviews and makes the final decision for the Graduate Student Petition (Form G701), the Academic Probation Contract (Form G702), and academic dismissal action as well as monitors and maintains this bulletin. The college also provides both optional and mandatory thesis workshops, as well as preliminary and final thesis examinations.

Idea Shop

ipro.iit.edu/ideashop

A catalyst for innovation, the Grainger Maker Space and the Duchossois Idea Shop facility is composed of state-of-the-art rapid prototyping labs that include 3D printers, CNC mills, electronics workstations and many hand fabrication tools; a Dell laptop lab; an iPad library; a computer lab for mobile app development and video editing; collaborative teaming areas; and flexible open spaces. The Idea Shop is home to the university's Interprofessional Projects Program (IPRO) and entrepreneurship initiatives. The Grainger Maker Space and Duchossois Idea Shop are located in the Ed Kaplan Family Institute for Innovation and Entrepreneurship.

International Center

McCormick Tribune Campus Center, Room 106
312.567.3680

icenter@iit.edu
iit.edu/international-center

The International Center exists in order to provide professional support, services, and resources to the Illinois Tech community in matters related to international education and cultural exchange by 1) supporting international students, faculty, and staff, as well as students studying abroad; and 2) assisting in the compliance of immigration and other related regulations.

These services include:

- Individual and group orientations to the university and community
- Assistance with United States Department of Homeland Security and U.S. Department of State document preparation for employment, and status maintenance
- Workshops for faculty, staff, and students on issues affecting international students and scholars
- Cross-cultural activities and programs that promote intercultural perspectives and address adjustment issues
- Advisement for students interested in studying abroad

All international students, scholars, and faculty are required to report to the International Center immediately upon arrival into the U.S./ Chicago.

Interprofessional Projects Program

3137 South Federal Street
ipro@iit.edu
ipro.iit.edu

Since its beginning in 1995, IPRO has brought together students and faculty of all disciplines to research issues, define problems, and develop real-world solutions. All undergraduate students are required to take six credit hours of IPRO courses, which provide hands-on experience in real-world, challenging projects. Generally, undergraduate students take these courses during the second through fifth year of study. Each IPRO course is a unique project with teams that include the faculty and enrolled students. IPRO courses encourage intellectual inquiry with research on the project subject, analysis, design, and development. Professional ethics, writing, teamwork, communication, and presentations round out the IPRO learning objectives. IPRO projects are intended for students to gain knowledge that goes beyond the traditional classroom experience.

Leadership Academy

312.567.7972
leadership.academy@iit.edu
leadership.iit.edu

The Leadership Academy is an integral component of the university's interprofessional approach to undergraduate education. Its objectives are to create and implement an effective leadership development curriculum for undergraduate students, to identify and support students with exceptional leadership potential, and to evaluate leadership development outcomes at individual and program levels. Currently, the academy offers scholarships and mentors to the scholarship recipients. It also offers the Sophomore Leadership Retreat, a series of engaging leadership development seminars, which any full-time undergraduate student can attend and earn points toward the Certificate in Leadership Development.

Libraries

312.567.6847
library@iit.edu
library.iit.edu

Illinois Institute of Technology's libraries include Paul V. Galvin Library; the Center for the Study of Ethics in the Professions (Mies Campus); the Graham Resource Center (Mies Campus); the Chicago-Kent College of Law Library (Downtown Campus); the Institute for Food Safety and Health Library (Moffett Campus); and University Archives and Special Collections (UASC) (Mies Campus).

Paul V. Galvin Library

312.567.6847
library.iit.edu

As the university's central library, Paul V. Galvin Library combines digital access with traditional library services. Galvin Library provides welcoming, safe, student-oriented spaces that accommodate both individual and collaborative learning including reservable group study rooms and spaces for students participating in interviews or video conferences. In addition to 3-D printing, Galvin Library facilitates the use of an electronic cutter and button makers for student and student group use. Laptops and Wi-Fi hotspots are available for check-out in addition to traditional library resources. Galvin Library's extensive collections of print materials are enhanced by virtual services that are provided 24 hours per day allowing seamless access to online databases as well as thousands of full text e-journals and e-books. Galvin Library also facilitates access to I-Share, a statewide resource sharing system of more than 90 academic libraries, and provides web-based delivery of materials via interlibrary loan. Galvin Library also manages an institutional repository, open to all Illinois Tech students. Librarians have expertise to support a broad range of subjects and majors and are available for online or in-person assistance. Students can make research appointments for one-on-one research help with a librarian who specializes in their area of study.

Graham Resource Center

312.567.3256
arch.iit.edu/about/library

Located in the heart of Crown Hall, the Graham Resource Center (GRC) offers space, collections, and services in support of the curricula and intellectual life of the College of Architecture. To keep services flexible and responsive to learners' needs, staff collaborate closely with faculty. To be a strong and reliable partner in research and education, the GRC is fully integrated into daily life at the College of Architecture.

In the past ten years, the GRC has expanded twice in order to accommodate growing use and collections. A wealth of subjects in architecture, from prehistory to the present, are encompassed by the collection of about 18,000 volumes in a variety of languages and formats. Modernist and contemporary architecture, landscape architecture, and urban design are primary focuses. Complementary disciplines such as construction, art, photography and film, engineering, and sustainability are also well-represented.

Two special research resources augment the GRC reference collections: works on Chicago's history, peoples, land, and architecture comprise the first, putting into context Chicago and its built environment; the second, our "Mies Collection," features a comprehensive Mies van der Rohe bibliography and study collection, as well as materials relating to the history of Illinois Tech's campus and faculty.

Center for the Study of Ethics in the Professions

312.567.6913
ethics.iit.edu

The center, located on the 14th floor of the IIT Tower, contains a variety of materials dealing with professional and applied ethics, as well as how ethical and social issues arise in scientific research and emerging technologies. Home to the Ethics Codes Collection, the largest collection of codes and ethics and guidelines in the world, the library provides bibliographic assistance to students and researchers and assists visiting scholars and practitioners.

Chicago-Kent College of Law Library

312.906.5600
kentlaw.iit.edu/library

Chicago-Kent Law Library offers a comfortable library center for study and research with a skilled and friendly staff to support student academic life and faculty scholarship. Professional law librarians possess the expertise to provide research and reference assistance in all areas of law and legal technology training through in-class presentations and personal assistance. The library offers multi-disciplinary print and electronic collections and connects students and faculty to an expanded array of materials through a statewide resource-sharing system and interlibrary loan. Through the library's website, the law school community has remote access to a wide variety of legal databases collections and electronic journals. Library space includes a spacious reading room for independent study and group study rooms for collaborative work.

Institute for Food Safety and Health Library

708.563.8160
library.iit.edu/ifsh

Located on Illinois Institute of Technology's Moffett Campus in Bedford Park, the branch library at the Institute for Food Safety and Health (IFSH) supports both the academic curriculum for the Department of Food Science and Nutrition, and the food safety and technology research being conducted at IFSH.

A depository library for the FAO (Food and Agriculture Organization of the United Nations), the library provides digital access to all of the Galvin Library's databases, as well as services such as interlibrary loan, web-based document delivery, and library instruction.

University Archives and Special Collections

312.567.6840
archives.iit.edu

Part of the Paul V. Galvin Library, University Archives and Special Collections (UASC) holds materials relating to every aspect of Illinois Institute of Technology's history, including non-current university records, papers of faculty members, alumni, and student organizations; publications, photographs, audiovisual materials, artifacts, and more. UASC holdings are non-circulating, and no special credentials or permissions are necessary to use the materials; UASC is open to the Illinois Institute of Technology community and general public for research and reference use. UASC staff are also able to assist students, faculty, and staff with archival research, and are available for classroom instruction sessions using primary source materials. Holdings can be searched at archives.iit.edu.

Office of Inclusion, Diversity, and Employer Engagement

IIT Tower, Suite 2C7-2
312.567.3777
idee@iit.edu (scdi@iit.edu)

Mission

The Office of Inclusion, Diversity, and Employer Engagement (IDE^2) serves as a catalyst to connect industry, individuals, and communities in support of education and career preparation that is respectful, responsible, and professional.

Vision

Our overarching lens will be one of diversity and inclusion in our approach to creating a comprehensive network of opportunities that will broaden mindsets, yield growth, provide and transition support. IDE^2 is guided by five core values that shape our approach to diversity, inclusion, and employer engagement at Illinois Institute of Technology.

Core Values

Experiential and Reflective Learning

We are committed to supporting lifelong learning, which is best achieved through hands-on interaction coupled with intentional reflection. This practice provides an opportunity for students, scholars, companies, and community members to explore cultural practices, traditions, academic disciplines, and personal experiences. Through this process we also learn about our own values and strengths, deepening our ability to promote, take intentional action, and express empathy.

Collaboration and Commitment

We are committed to addressing the complex career challenges that our diverse student body is facing and progress can only be achieved through meeting the individual needs of scholars. Our work relies heavily on relationships with companies, community partners, students, staff, faculty, and alumni. These relationships take time to build and require continuous investment and renewal. We are committed to the process required for successful collaboration and seek to form communal partnerships to make long-term sustainable differences.

Shared Wisdom

We are committed to respecting imagination worldwide. Universal wisdom comes from lived experiences and everyone can serve in the role of teaching. We rely on a variety of shared wisdom to help us identify comfort zones, and we value our corporate and community partners as co-educators who support student learning inside the classroom and beyond.

Student Engagement

We are committed to enlightening and empowering students so that they are comfortable undertaking responsibility. Students can use their honored positions to serve others and contribute to broader movements of engagement. We value students' passions, talents, ideas, and experiences and believe in their capacity to be successful change agents and leaders on and off campus.

Embrace and Drive Change

We are committed to servicing the diverse needs of everyone. Societal structures tend to lean toward the privileged majority and dominant groups. Without the intentional actions of individuals, the needs of those with fewer resources are disregarded. We believe that there are enough resources to meet the basic needs of all, which enables each person to live a full life with dignity. Illinois Institute of Technology has a responsibility to promote and introduce respectful and compatible career opportunities that support freedom of thought, inquiry, and expression.

Key Pillars

We are committed to excellence and quality in all of our endeavors. Three key pillars have been identified to provide strength and support for our vision:

- Pillar 1: Employer and Alumni Engagement
- Pillar 2: Core Initiatives and Programs
- Pillar 3: Transformative Student Experience

Signature Initiatives

- **Professional Student Organizations (PSOs) and Honor Societies –** A network program that supports a responsive academic-industry partnership for students and compliments the classroom experience.
- **Illumination Sessions –** This program is a platform where primarily alumni from companies are able to come to campus and share insight on business culture and the workplace environment to better prepare students for the workforce.
- **Alumni Career Voices –** A collection and sharing of alumni career experiences through statements internally and externally.
- **Diversity and Inclusion Council –** A brain trust of advisers comprised of volunteers from corporations and nonprofit sector leaders who meet on a quarterly basis to share best practices.
- **Diversity Research Scholars (DRS) –** Internships are provided to college students from other institutions to research diversity in the workplace at Illinois Institute of Technology. The program takes an insightful look into federal, state, and local diversity laws that impact workplace hiring, promotion, and retention practices.

Programs

- **Industry Sharing Table –** A bridge that provides faculty, alumni, departments, and companies with a connection to each other and students for the purpose of exchanging ideas and information.

Resources

- **True North Career Guides –** Library guides that provide inclusive resources for marginalized groups in support of individual career planning.

Registrar

312.567.3100
registrar@iit.edu
iit.edu/registrar

The Office of the Registrar serves as the official data steward of institutional academic information and student records to support the needs of students, faculty, staff, and alumni at Illinois Institute of Technology. The office maintains accurate, timely, and secure information to support and enforce academic policy, registration, grading, enrollment and degree certification, course information, the production of diplomas and official transcripts, and other related university functions. Our knowledgeable and helpful staff are dedicated to providing courteous and professional service.

Requests or questions about student records and registration should be directed to the Office of the Registrar at registrar@iit.edu. Illinois Tech faculty, staff, and students should use their Illinois Tech email address when contacting the office.

The Chicago-Kent College of Law Registrar's Office can be reached at REGQ@kentlaw.iit.edu or 312.906.5080.

Residence Life

3241 S. Wabash Ave., Suite 110
312.567.5075
housing@iit.edu
iit.edu/housing

On-campus housing is available to both undergraduate and graduate students. First-year and second-year students not living with their parents or guardians within a 20 mile radius of campus are required to live in the residence halls. Family housing is provided for students who are married, living with a domestic partner, or have a legal guardianship of a dependent. Students living in the residence halls are eligible for a variety of meal plans. Required participation in a meal plan varies based on room assignment.

The Office of Residence Life (ORL) offers a wide range of accommodations, programs, and services designed to enhance campus life. Housing options vary from shared dormitory style rooms to fully furnished apartments with kitchens. ORL maintains residence halls designed to meet the different needs of students. Within these buildings, professional and paraprofessional staff coordinate academic and social programming, provide leadership opportunities to residents, and assist students with personal and academic concerns.

To learn more about on-campus housing options, please contact the Office of Residence Life at housing@iit.edu or visit the website at iit.edu/housing.

Student Affairs

McCormick Tribune Campus Center, Room 209
312.567.3081
dos@iit.edu
iit.edu/student-affairs

Activities outside the classroom and laboratory complement and enhance the university's central educational mission. Illinois Institute of Technology encourages all students to participate in athletics, student organizations, and professional societies. Students are also encouraged to take advantage of the cultural, educational, and recreational resources on campus, as well as in the Chicago area. For additional information on activities, organizations, and services, consult the Student Handbook (web.iit.edu/student-affairs/handbook).

The Office of Student Affairs oversees many areas of student life and provides advocacy for all Illinois Tech students. The office also oversees the student conduct process. Students, faculty, and staff are encouraged to contact the office for help or referrals.

Student Employment Office

IIT Tower, 13D3-2
312.567.5729
seo1@iit.edu
studentemployment.iit.edu

The Student Employment Office (SEO) oversees all aspects of on-campus employment for students and their faculty and staff supervisors, including hiring processes and best practices, to provide students with meaningful and professional on-campus employment experiences. This office establishes policies and procedures, develops resources for student employment training and evaluation, and enforces compliance with institutional policies and federal regulations. See the Student Employment website for more information.

Student Health and Wellness Center

IIT Tower, 3rd Floor
312.567.7550
Appointments
student.health@iit.edu
iit.edu/shwc

The Student Health and Wellness Center (SHWC) provides quality and cost-sensitive healthcare tailored to the needs of our students. The goal of SHWC is to provide campus health and wellness resources that enable students to successfully achieve their academic goals and promote lifelong wellness. The SHWC provides primary care and counseling services, as well as oversees the student health insurance plan and immunization compliance. The SHWC provides administrative oversight of the Aetna Student Health Insurance Plan provided to students registered for one or more academic credit hours. Health insurance is not required to use the SHWC. Students are able to schedule medical and counseling appointments through the Patient Portal.

SHWC provides diagnosis and treatment of most common illnesses and injuries with the ability to provide appropriate prescriptions. Immunizations, allergy injections, gynecological care, sexual health screening, and walk-in appointments are also provided. A small fee may incur for labs, diagnostic tests, immunizations, and medication given on site.

Counseling services include individual and group psychotherapy, community referrals, and medication management. Treatment length varies depending on individual needs. Counselors are experienced to address many issues students may face including, but not limited to, loneliness, relationship concerns, family issues, self-esteem, depression, anxiety, concentration difficulties, sleeping difficulties, eating disorders, addiction, sexual concerns, anger management, cultural adjustment, and other personal issues.

The SHWC team of culturally sensitive professionals provides comprehensive clinical services and outreach programs to students. In addition, SHWC is a resource for consultation to faculty, staff, and parents.

Technology Services

Support Desk: 312.567.3375
supportdesk@iit.edu
iit.edu/ots

The Office of Technology Services (OTS) supports Illinois Institute of Technology's primary technology systems, including administrative systems, the myIIT.edu portal, Banner, and the network and telephone infrastructures. OTS also supports the HAWKi mobile application, which was developed in partnership with the Student Government Association who provided their input in the design, content selection, and naming of the app. With HAWKi, many useful resources are at students' fingertips; students can: (1) view course assignments, class rosters, grades, discussions, class announcements, and updates; (2) view their course schedules and sync them with their mobile devices' calendars; (3) check out the latest events happening on campus; and much more! The app will continue to change and grow to reflect students' needs and desires.

OTS maintains approximately 579 workstations in its classrooms, labs, and public terminals throughout the Mies, Downtown, Rice, and Moffett Campuses, including an online Virtual Computer Lab, which enables students to schedule an ad hoc connection to the most frequently used academic lab software from their own devices, including laptops and tablets, at any time, from any location. To ensure that students have access to equipment that supports their academic goals, OTS offers laptops and MiFi-devices for checkout through the Galvin Library Circulation Desk. Additionally, the computers in the classrooms and labs are refreshed on a regular basis. OTS also supports remote printing from personal laptops/desktops and mobile devices to printing release stations located in various computer labs and public areas. Additional information about these services is available on the OTS website.

OTS manages the myIIT portal (my.iit.edu), which provides personalized access to email, Google Apps, online course registration, Blackboard, OTS Support, student financial information, student life, weblinks, tools, and other content. All Illinois Institute of Technology students receive an email address integrated into their Google Apps for Education account, which is accessed via the portal. Google Apps for Education also includes collaboration tools such as Google Docs, Sheets, Meet, Chat, Sites, Groups, and more. Course material is available through Blackboard, Illinois Tech's course management system, wherein instructors post lectures, notes, assignments, and other course information. Blackboard Collaborate and other interactive tools within Blackboard Learn are available to enhance students' learning experience. Illinois Tech's distance-learning content and video lectures are also accessed through Blackboard.

The university provides Internet access through its wired and wireless networks. Most campus buildings have wired Internet access and secured wireless Internet access is available campus-wide. Visit the OTS website to view the university's current Wi-Fi networks, which cover 100% of the occupied and used space on campus. Instructions for connecting to the Internet through the university network, including how to configure and register personal computers and mobile devices, are also available on the OTS website.

The OTS Support Desk is the central point of contact for technology support at the university. Support Desk staff provide technical troubleshooting, account management, and configuration assistance for all students, faculty, and staff. OTS support is available through the myIIT portal and includes a knowledge database with how-to information for common technical issues and questions. A request for technical support may be submitted by opening a ticket through the OTS website, sending a request via email (supportdesk@iit.edu), or by calling the Support Desk at 312.567.3375.

Visit the OTS website for the most up-to-date information and useful details about the university's technology.

Undergraduate Academic Affairs

IIT Tower, Suite 2F9-1
312.567.3300
ugaa@iit.edu
iit.edu/ugaa

The Office of Undergraduate Academic Affairs (UGAA) provides a variety of academic support services for all undergraduate students from the time of admission to graduation. These services include academic advising; academic program audits; student petitions; course repeats for a change of grade; change of major; monitoring of academic progress; certification of student's eligibility for degree conferral; granting an official leave of absence; and official withdrawal from the university. In addition, this office reinstates former undergraduate students to the university and maintains the official academic files for all undergraduate students. Degree Works, the online degree audit system, is monitored and maintained by the Office of Undergraduate Academic Affairs.

Writing Center

Siegel Hall 232/233/234

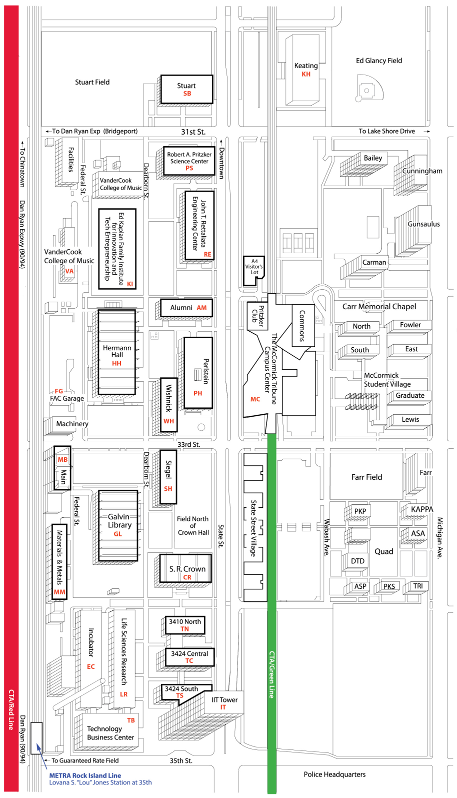
humanities/student-resources/writing-center

Students can seek assistance with written and oral assignments at the Illinois Tech Writing Center, located in Siegel Hall 232/233/234. Tutors are available to assist students enrolled in writing-intensive courses (Introduction to the Profession, C-courses, and IPROs). Tutors specializing in English as a Second Language are also available to assist students whose primary language is not English. Appointments can be made in advance on the sign-up sheets on Siegel 232/233/234 doors. Walk-in appointments are also possible when tutors are not working with other students. Tutoring is free of charge, and both undergraduate and graduate students are welcome.

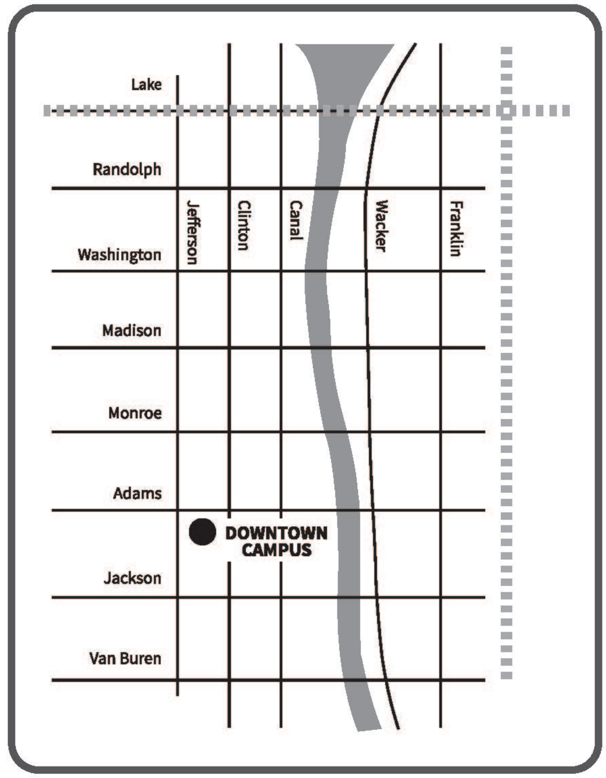
Campus Overview

Campus Resources

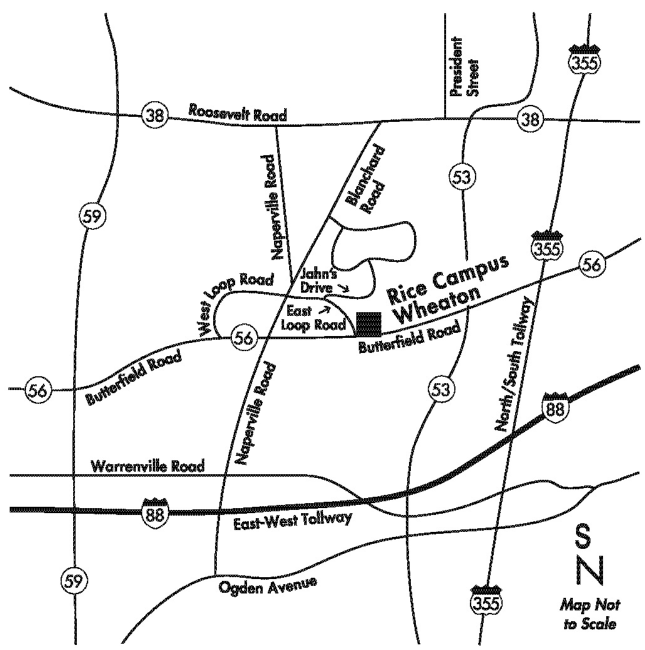
Mies Campus



Downtown Campus



Rice Campus

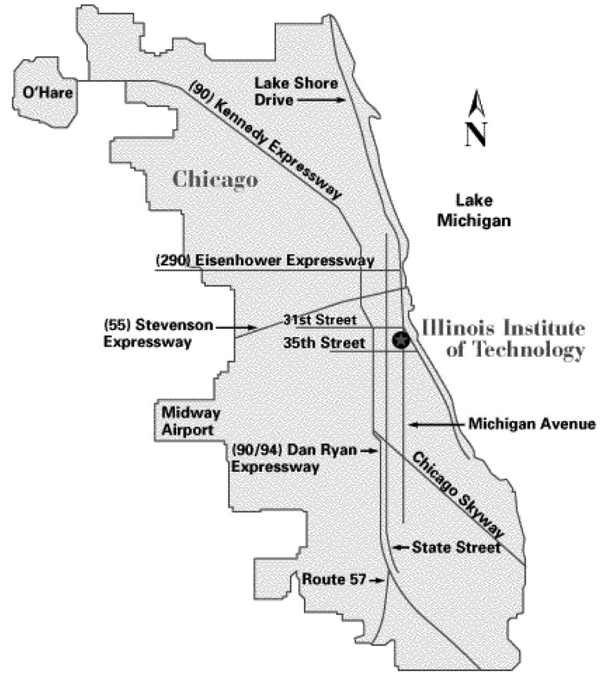


Directions

Getting to Mies Campus

Airports

Illinois Institute of Technology and Chicago are served by O'Hare International Airport and Midway International Airport. Public and private transportation is available from the airports to downtown Chicago and the university campuses.



Train

Metra Rail Rock Island District line to 35th Street/Lou Jones/ Bronzeville station.

Other commuter railroad lines to Union and Northwestern train stations (both off Canal Street), then public transportation, taxi, or Illinois Tech shuttle bus from the Downtown Campus at 565 West Adams Street to Mies Campus.

Bus

To Greyhound or Continental Trailways terminal, then taxi or public transportation to the university.

Public Transportation

1. CTA Red Line (Howard-Dan Ryan) to 35th Street Station.
2. CTA Green Line (Lake-Englewood-Jackson Park) to 35-Bronzeville-IIT station.
3. CTA bus lines with stops on State Street (#29) or Michigan Avenue (#35).

Automobile

From North: Dan Ryan Expressway east to 31st Street exit, continue south to 33rd Street, turn left (east). Metered parking is located along Federal Street north and south of 33rd Street, and in the Visitor's Parking Lot (Lot A4) at 32nd Street and State Street, on the east side of State Street.

From South: Dan Ryan Expressway west to 35th Street exit, continue north to 33rd Street, turn right (east). Metered parking is located along Federal Street north and south of 33rd Street, and in the Visitor's Parking Lot (Lot A4) located at 32nd Street and State Street, on the east side of State Street.

From Lake Shore Drive: Exit at 31st Street, go inland (west) to State Street, turn left (south). Metered parking is available in the Visitor's Parking Lot (Lot A4) located at 32nd Street and State Street, on the east side of State Street.

Parking

Pay station parking is available to all visitors and is located in designated lots on State Street between 31st and 35th streets. Special event parking may be available in other parking lots on campus. Please contact the Access, Card, and Parking Services Office for more details on parking, or visit the parking web page for current parking locations at web.iit.edu/acaps/parking. Please call the parking administrator at 312.567.8968 if you need assistance in finding parking.

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