ILLINOIS INSTITUTE OF TECHNOLOGY

Bulletin:
Undergraduate Programs
2010 - 2012

Foreword for the IIT Undergraduate 2010-2012 Bulletin

Purpose of the IIT 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 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 IIT in the academic years 2010–2012. 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 advisor 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 **www.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 IIT community.

To this end, IIT 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, IIT 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 IIT 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 he or she has received inequitable treatment because of discrimination violating IIT's stated policy of equal opportunity in employment and in education should communicate, either in writing or in person, with the affirmative action officer, 224 Perlstein Hall, Illinois Institute of Technology.

For descriptions of graduate programs and courses, see the ***IIT Bulletin: Graduate Programs***. For descriptions of law programs and courses, see the ***Chicago-Kent College of Law Bulletin***.

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

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IIT Academic Calendar for Fall

		TENTATIVE*	
	2010	2011	2012
Fall Classes Begin	Aug 23	Aug 22	Aug 20
Last Day to Add/Drop with 100% Tuition Refund	Sept 3	Sept 2	Aug 31
Labor Day–No Classes	Sept 6	Sept 5	Sept 3
Fall Degree Conferral Applications Due	Sept 13	Sept 12	Sept 10
Homecoming Weekend	Sept 24	Sept 30	Sept 28
Spring & Summer Incomplete Grades Due	Oct 4	Oct 3	Oct 1
Fall Break Day	Oct 11	Oct 10	Oct 8
Midterm Grades Due	Oct 22	Oct 21	Oct 19
Spring & Summer Class Schedule Published	Oct 25	Oct 24	Oct 22
Last Day to Withdraw	Nov 1	Oct 31	Oct 29
Spring Registration Begins	Nov 8	Nov 7	Nov 5
Thanksgiving Break Begins	Nov 24	Nov 23	Nov 21
Last Day of Fall Classes	Dec 4	Dec 3	Dec 1
Final Exams Begin	Dec 6	Dec 5	Dec 3
Final Grades Due at Noon	Dec 15	Dec 14	Dec 12
Fall Degree Conferral Date	Dec 20	Dec 19	Dec 17

IIT Academic Calendar for Spring

		TENTATIVE*	
	2011	2012	2013
Spring Classes Begin	Jan 10	Jan 9	Jan 14
Martin Luther King Day–No Classes	Jan 17	Jan 16	Jan 21
Last Day to Add/Drop with 100% Tuition Refund	Jan 21	Jan 20	Jan 25
Spring Degree Conferral Applications Due	Jan 31	Jan 30	Feb 4
Fall Incomplete Grades Due	Feb 21	Feb 20	Feb 25
Midterm Grades Due	Mar 11	Mar 9	Mar 15
Spring Break Week Begins	Mar 14	Mar 19	Mar 18
Fall Class Schedule Published	Mar 21	Mar 26	Mar 25
Last Day to Withdraw	Mar 28	Apr 2	Apr 1
Summer & Fall Registration Begins	Apr 4	Apr 9	Apr 8
Graduate Salute Days Begins	Apr 18	Apr 16	Apr 15
Commencements RSVPs Due	Apr 20	Apr 18	Apr 17
Last Day of Spring Classes	Apr 30	Apr 28	May 4
Final Exams Begin	May 2	Apr 30	May 6
Senior Week Begins	May 9	May 7	May 13
Final Grades Due at Noon	May 11	May 9	May 15
Spring Degree Conferral & Commencement	May 14	May 12	May 18

IIT Academic Calendar for Summer

		TENTATIVE*	
	2011	2012	2013
Summer Classes Begin	May 23	May 21	May 28
Last Day to Add/Drop with 100% Tuition Refund	May 27	May 25	June 3
Memorial Day–No Classes	May 30	May 28	May 27
Summer Degree Conferral Applications Due	June 3	June 1	June 7
Midterm Grades Due	June 17	June 15	June 21
Last Day to Withdraw	June 27	June 25	June 28
Independence Day–No Classes	July 4	July 4	July 4
Last Day of Summer Classes/Exams	July 16	July 14	July 20
Final Grades Due at Noon	July 20	July 18	July 24
Summer Degree Conferral	July 23	July 21	July 27

* Dates subject to change. See "Important Dates" at **www.iit.edu/registrar** for current information.

Colleges of Illinois Institute of Technology

Armour College of Engineering

Natacha DePaola
Carol and Ed Kaplan Armour Dean of Engineering
220 Engineering 1 Building
10 W. 32nd Street
Chicago, IL 60616
312.567.3009
www.iit.edu/engineering

Armour College is named for IIT's predecessor, Armour Institute of Technology, which was established in 1892 on the site of the present IIT Main Campus.

The following departments comprise Armour College: Biomedical Engineering; Chemical and Biological Engineering; Civil, Architectural and Environmental Engineering; Electrical and Computer Engineering; and Mechanical, Materials and Aerospace Engineering.

College of Architecture

Donna V. Robertson, FAIA
Dean, John H. and Jeanne M. Rowe Chair
S.R. Crown Hall
3360 S. State Street
Chicago, IL 60616
312.567.3230
www.iit.edu/arch

The program in architecture was established at Armour Institute of Technology, one of IIT'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 tutelage of a faculty of practicing architects; the study of architectural theory; interdisciplinary learning; digital technologies; sustainability; design/build; and international study.

College of Science and Letters

R. Russell Betts
Dean
125 Engineering 1 Building
10 W. 32nd St.
Chicago, IL 60616
312.567.3800
www.iit.edu/csl

The College of Science and Letters traces its roots to the Lewis Institute, founded in 1895. The Lewis Institute joined with Armour Institute of Technology in 1940 to form the current Illinois Institute of Technology. The College of Science and Letters offers some 50 academic specializations in six departments: Applied Mathematics; Biological, Chemical, and Physical Sciences; Computer Science; Lewis Department of Humanities; Mathematics and Science Education; and Social Sciences.

Institute of Psychology

M. Ellen Mitchell, Ph.D.
Dean
252 Life Sciences Building
3105 S. Dearborn St.
Chicago, IL 60616
312.567.3500
www.iit.edu/psych

Established in 1995, the Institute of Psychology is noted for its applied graduate programs in clinical, industrial/organizational, and rehabilitation psychology. The Institute offers an undergraduate program that is focused on psychology as a science linked to the professions. The B.S. degree in psychology has three optional specialty tracks from which to choose: Culture, Conflict, and International Relations; Psychology of Emerging Technologies; and the Human Environment.

School of Applied Technology

C. Robert Carlson
Dean
Daniel F. and Ada L. Rice Campus
201 East Loop Road
Wheaton, IL 60187
630.682.6000
www.iit.edu/applied_tech

The School of Applied Technology offers technology-oriented training and education for working professionals. Courses are taught by IIT professors and industry professionals with significant working, teaching, and research experience in their fields. The IIT School of Applied Technology offers education and training in a wide variety of formats including degree, non-degree, certificate, credit, and non-credit programs; corporate training; short courses; and seminars ranging from a few hours to several days in length. Completion of all IIT School of Applied Technology non-credit courses will result in the assignment of Continuing Education Units (CEU) fully accredited by the International Association for Continuing Education and Training (IACET).

The IIT School of Applied Technology offers undergraduate degree programs in Information Technology and Management and Industrial Technology and Management; graduate programs in Information Technology and Management and Industrial Technology and Operations; an undergraduate certificate in Manufacturing Technology and Management; a graduate certificate in Computer and Network Security Technologies; Professional Engineer (PE)/ Engineering Intern (EI) Review courses and continuing education courses for Professional Engineers; and a wide variety of non-credit semester-length and short courses in all disciplines. Through IIT Online, the IIT School of Applied Technology markets and manages online delivery of IIT degree and non-degree educational offerings in all disciplines.

Stuart School of Business

Harvey Kahalas
Dean
Downtown Campus
565 W. Adams St.
Chicago, IL 60661
312.906.6500
www.stuart.iit.edu

The Stuart School of Business was established in 1969 with a gift from IIT alumnus and Chicago financier Harold Leonard Stuart. The School places an emphasis on the relation between business and technology and cross-disciplinary education. Stuart offers AACSB-accredited undergraduate programs (BSBA and BSBA and Applied Science). Its graduate programs include the Master of Business Administration (MBA), Master of Science in Environmental Management and Sustainability, Master of Science in Finance, Master of Science in Marketing Communications, and a JD/MBA, and an MS Design/MBA. The School houses the Center for Financial Markets, the Center for Strategic Competitiveness, the Center for Sustainable Enterprise, and the Center for Management of Medical Technology.

Graduate Colleges of IIT

The objective of graduate education at IIT is to provide programs that enhance students' fundamental knowledge of their chosen field.

Furthermore, IIT 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 IIT'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.

Graduate College

Ali Cinar
Dean
301 Main Building
3300 S. Federal St.
Chicago, IL 60616
312.567.3024
www.iit.edu/graduate_college

The Graduate College coordinates the programs of advanced study offered by the academic units of the university. The college consists of the following offices: Office of the Dean and Vice Provost for Research; Office of Sponsored Research and Programs; Office of Research Compliance and Proposal Development; Graduate Enrollment; Graduate Academic Affairs; Distance Learning; and the Office of Editorial Assistance (Thesis Examiner). The dean chairs the Graduate Studies Committee and the Research Council, sets minimum standards for graduate students, represents the university in national forums for graduate education, and serves as an advocate for promoting graduate education and research across the university.

Chicago-Kent College of Law

Harold J. Krent
Dean
Downtown Campus
565 W. Adams St.
Chicago, IL 60661
312.906.5000
www.kentlaw.edu

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

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

Institute of Design

Patrick F. Whitney
Dean
Fourth Floor
350 N. LaSalle St.
Chicago, IL 60610
312.595.4900
www.id.iit.edu

Since its founding as the New Bauhaus in 1937, the IIT Institute of Design (**www.id.iit.edu**) has grown into the largest full-time graduate-only design program in the U.S. with over 150 students from around the world. The school offers professional Master of Design degrees in communication design, interaction design, product design and development, strategic design, systems, thinking, and use research; a dual Master of Design/MBA degree program with the IIT Stuart School of Business; and the Master of Design Methods, a nine-month executive program in design methods for innovation. The Institute of Design also offers a Ph.D. in design, the country's first such program, created in 1991.

Accreditation

IIT is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools.

Commission URL:
www.ncahlc.org
Commission Telephone: 312.263.0456

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, and National Architectural Accrediting Board.

IIT History and Campuses

IIT's traditions span more than a century of innovation and educational leadership. IIT came into being in 1940 with the merger of Armour Institute of Technology (founded in 1892) and Lewis Institute (founded in 1896).

Today, the university has several campuses and offers degree programs through the College of Architecture, Armour College of Engineering, Chicago-Kent College of Law, Institute of Design, School of Applied Technology, Institute of Psychology, College of Science and Letters, and Stuart School of Business.

The 120-acre Main Campus is located three miles south of the central business district in Chicago, and is internationally known for its architecture. The Master Plan of the campus and many of its 50 buildings were developed by Ludwig Mies van der Rohe, one of the 20th century's most influential architects.

IIT's Downtown Campus, at 565 W. Adams St. in the West Loop business district, houses the Chicago-Kent College of Law and the Stuart School of Business. A shuttle bus provides transportation between the Main and Downtown campuses.

The Institute of Design, 350 N. LaSalle St., is in an outstanding downtown location and state-of-the-art facility.

The Daniel F. and Ada L. Rice Campus, at 201 E. Loop Road in Wheaton, Ill., is IIT's west-suburban location. Graduate and upper-division undergraduate courses and degree programs are available at the Rice Campus with evening and Saturday classes and via courses broadcast live through IIT Online.

The School of Applied Technology offers degree programs in information technology and management, industrial technology and management, non-credit short courses, and information technology training programs.

IIT Online delivers courses via the Internet and also links classroom studios on campus with remote TV receiving sites. IIT Online's talk-back feature permits students in receiving classrooms to participate in class discussions. IIT has more than 20 receiving sites throughout the Chicago area.

The Moffett Campus, in southwest-suburban Summit-Argo, houses the National Center for Food Safety and Technology (NCFST), a multidisciplinary food safety research operation, which is funded by the U.S. Food and Drug Administration and supported by the food industry. Established with a gift from CPC International, Inc., the campus has enabled the university to develop academic programs in food safety and technology. Courses leading to masters' degrees and certificate programs in food safety and technology and in food process engineering are offered at this facility.

A Snapshot of the IIT Community

Enrollment (Fall 2009)

Undergraduate	2,665 students
Graduate	3,926 students
Law	1,116 students
Total	7,707 students

Student Demographics

Male	65%
Female	35%
Minority*	16%
International	38%
Countries of Origin	90
Student/Faculty Ratio	10:1

Degrees Awarded 2008-2009

Bachelor	471
Master and Professional Master	1478
Law	287
Ph.D.	77
Total	2,313

* Includes African American, Asian American, Hispanic American, and Native American.

Admission, Financial Aid, and Expenses

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, ROTC, post baccalaureate, Joint Program, dual admission, Shimer College, and summer transfer students.

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

Acceptance of Admission

To accept IIT's offer of admission, all students must return the **Enrollment Form** which is sent to every admitted student. Full-time students must submit a non-refundable $300 matriculation deposit. This deposit is credited to the student's account and will go toward the cost of attendance.

Campus Locations

Students can take courses at either the Main Campus or the Daniel F. and Ada L. Rice Campus in Wheaton, a Chicago suburb. The Main 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.

IIT Online, which is IIT's distance education unit, delivers courses via the Internet and also links classroom studios on campus with remote TV receiving sites. IIT Online's talk-back feature permits students in receiving classrooms to participate in class discussion. No full degree program may be completed entirely online. Undergraduate students must have approval to complete courses online. For additional information, visit **www.iit-online.iit.edu**.

Application as a First-Year Student

Special programs and scholarships have specific deadlines and supplemental applications. See **admission.iit.edu** for details. Students have until May 1 (National Candidates' Reply Date) to accept IIT's offer of admission. Students admitted after May 1 will have two weeks from the receipt of their admission and/or financial aid award letters to respond to IIT's offer. To accept IIT's offer of admission, a student must return the Enrollment Form, which is sent to every admitted student, and a non-refundable matriculation deposit by the above dates.

Applicants must submit a completed application, transcripts from all high schools attended, transcripts of all colleges (where applicable), standardized test scores (ACT or SAT I), and a letter of recommendation. International students should see additional requirements in the International Student section on page 11. 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 tests may be taken at any time, but preferably early in the high school senior year. Applicants for the spring semester (all majors except architecture) must have taken the SAT I or ACT by the preceding November. IIT 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.

Required:

- 4 years of English
- 4 years of mathematics, including precalculus
- 3 years of science, including 2 years of lab

Recommended:

- 2 years of social sciences
- Computer and technology courses
- 2 years of foreign language

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 completed application for admission, official transcripts in the native language, certified English translation of all transcripts, TOEFL or IELTS scores, and an affidavit of financial support. Please read appropriate application requirements for first year or transfer students.

Prospective applicants should carefully read the description of requirements on the IIT website: **apply.iit.edu**.

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 except architecture, which is a fall-entry program only. See **admission.iit.edu** for deadlines.

The transfer application may be obtained by contacting the Office of Undergraduate Admission or visiting **apply.iit.edu**. Students must submit the IIT Transfer Application, transcripts for all colleges and universities attended, a personal statement, and a letter of recommendation to the Office of Undergraduate Admission.

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 IIT. Admission is based upon a cumulative GPA and individual grades in all classes that apply to the major selected. A minimum cumulative GPA of 3.0 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 hours of transferable graded college coursework must 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 generally be limited to non-degree, 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 IIT. Admission is based on prerequisite coursework or other preparation necessary for the intended course. Non-degree seeking students follow the same application procedures as transfer students.

Application for Summer School Admission

Students who attend another college or university and wish to enroll for summer courses at IIT with the intention of transferring the credits to their home institution must submit the following to the IIT Office of Undergraduate Admission:

- a Summer School Application
- a transcript and/or a letter of good standing that indicates completion of the prerequisites for the requested course(s) at IIT

Additionally, students should check with their home institutions to determine the equivalencies for specific courses and the policies and procedures required to transfer IIT courses.

Transfer of College-Level Credit

Transfer Credit

Official credit evaluations are completed only after a student is admitted to IIT. Courses may be acceptable for transfer from accredited colleges and universities, provided they are comparable in nature, content and level to those offered at IIT. Credit may also be accepted, based on appropriate documentation, for Dantes, military experience, and CLEP (see page 256). IIT does not grant credit for vocational courses or life/work experience. In addition, technology courses will not be accepted in any engineering program. IIT will accept college coursework taken while still in high school from other accredited universities and colleges.

All college transcripts are to be submitted as part of the application for admission to the Office of Undergraduate Admission, regardless of the transferability of credits.

A maximum of 68 applicable semester 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 IIT. Transfer credit will be accepted for courses completed with the equivalent of a grade C or better. A grade of C– is not acceptable for transfer credit. Grades from transfer courses are not included in the IIT cumulative or major GPA. 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 Academic Affairs (ugaa@iit.edu) regarding the transfer of courses from any college or university.

Advanced Placement Examinations

IIT will award credit for CEEB Advanced Placement Examinations. Credit will vary by test score. A complete list of acceptable AP scores and IIT course equivalents may be found at **www.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 4 or better. A maximum of 10 hours of credit can be awarded for each HL exam. No credit is granted for work completed at the subsidiary level (SL). Scores should be sent to the Office of Undergraduate Admission.

General Certificate of Education Examination - Advanced Level

College credit will be awarded for GCE A-level examinations with a grade of A, B, C, D, and E. A maximum of 10 hours of credit can be awarded for each A-level examination. No credit will be granted for advanced subsidiary level examinations.

Placement Testing

Placement testing is done prior to first enrollment. For students entering in the fall semester, placement tests are scheduled in the summer preceding matriculation. For students entering in the spring semester, placement tests are scheduled immediately preceding matriculation. Placement tests are only used for placing students into the appropriate courses. Test results do not appear on the student's official academic record and no academic credit is awarded.

Students are required to take up to three placement exams.

- All new first year and transfer students who have neither Advanced Placement credit nor transfer credit for MATH 151 - Calculus I are required to take the mathematics placement test.
- All new first year and transfer students who have neither Advanced Placement credit nor transfer credit for COM 101 - Writing in the University or COM 111 - Writing in the University for Non-Native students are required to demonstrate writing proficiency in one of two ways. They may either pass the writing placement exam prior to enrollment or receive a grade of C or better in COM 101 or COM 111 during their first year of attendance.
- Students in chemical engineering who have neither Advanced Placement credit nor transfer credit for CHEM 124 - General Chemistry are required to take the chemistry placement test.

Immunizations 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 IIT become the property of the University. Unless required to do so by law, IIT 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 Center at 312.808.7100 or **www.iit.edu/student_health**

Financial Aid

Comprehensive Financial Aid Program

IIT 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 and scholarship funds. Most federal and state funds are based on demonstrated financial need, with the exception of merit scholarships. Institutional funds include need-based grants and loans, as well as merit scholarships based on academic, athletic and service achievements. IIT uses the formula established by the U.S. Congress to determine financial need for assistance. IIT offers limited academic scholarship assistance to international students.

Student Eligibility Requirements to Receive Federal and State Financial Assistance

Students must be U.S. citizens or eligible non-citizens and be enrolled in a degree-seeking program for at least half-time (six credit hours or more per semester) and demonstrate reasonable academic progress toward graduation. International students are not eligible for federal financial aid.

Federal Financial Aid Application Process

All students applying for financial assistance need to complete the Free Application for Federal Student Aid (FAFSA). This application is available beginning January 1 of the academic year in which the student plans to attend. The IIT Title IV School Code is **001691**. The priority date for financial aid consideration at IIT is April 15. All financial assistance is awarded on an annual basis. Students should be aware that a FAFSA must be filed each academic year. The amount of financial aid that a student receives each year depends on demonstrated financial need and the availability of funds. Students applying for financial aid will be required to submit tax information upon request.

Determining Financial Need For Assistance

Financial need is the difference between a student's total annual cost of attending IIT and the amount the student and the student's family is expected to contribute toward that cost of education. The total cost of attendance at IIT includes tuition and mandatory fees, room and board, books and supplies, transportation, and personal expenses. The amount that the student and family is expected to contribute is called the expected family contribution (EFC). The U.S. Congress has established the formula used to calculate the EFC. The EFC is subtracted from the cost of attendance, and what is left over is considered to be the demonstrated need for financial assistance. One of the principles of need-based assistance is that students and their families are expected to help pay some of the cost of education.

First-Year Students

The Free Application for Federal Student Aid (FAFSA) for first-year students entering IIT is available online at **www.fafsa.ed.gov**. The priority date for financial aid consideration is April 15; therefore, new students should not wait for a final admission decision before filing the FAFSA.

Transfer Students

All new transfer students will file either a renewal or an original FAFSA. The priority date for financial aid consideration is April 15; therefore, new transfer students should not wait for a final admission decision before filing the FAFSA.

Continuing Students

All continuing students must submit either a renewal or original FAFSA to the U.S. Department of Education by April 15, which is the priority date for financial aid consideration. FAFSAs are available online at **www.fafsa.ed.gov**.

Federal Financial Aid Programs

Federal Pell Grant

A Federal Pell Grant is a federal 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. All students who file the FAFSA receive a Student Aid Report (SAR). If a student does not qualify for a Pell Grant, he or she may still be eligible for other forms of financial aid. Students can designate IIT as a SAR recipient by using the code **001691** in Section 5 of the FAFSA.

Federal Supplemental Educational Opportunity Grant (FSEOG)

An FSEOG is a federal grant that does not have to be repaid. This grant is for undergraduate students who demonstrate exceptional financial need. Students apply for the FSEOG by filing the FAFSA. IIT strongly encourages all students who wish to be considered for SEOG to submit the FAFSA to the Department of Education by the April 15th deadline.

Federal Perkins Loan

A Federal Perkins Loan is a low-interest (5 percent) federal loan for undergraduate students with exceptional financial need. IIT is the lender and the loan is made with government funds. There is no interest charged while the student is attending school. When a student leaves school or drops below half-time attendance, there is a nine-month interest-free grace period before the student begins repayment. All repayments are made to IIT. Students apply for a Perkins Loan by filing the FAFSA. Students who wish to be considered for the Federal Perkins program are strongly encouraged to submit the FAFSA to the Department of Education by the April 15th deadline. These awards are limited and awarded on a first-come, first-served basis.

Federal Work Study Program (FWS)

The FWS provides salaries for jobs for undergraduate and graduate students with demonstrated financial need. Students awarded FWS funds can earn money to help pay education expenses. 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 at least the current federal minimum wage or higher, depending on the type of work performed. Students are paid by the hour and receive a paycheck. FWS students should not work more than 20 hours per week during the academic year and may not work during their scheduled class times. Students apply for FWS by filing the FAFSA. Jobs are advertised by the Career Management Center, **www.cmc.iit.edu**. Additionally, this office assists students in finding summer employment and permanent jobs after graduation.

Direct Loan Program

The Direct loan program includes the Stafford subsidized and unsubsidized loan programs for undergraduate and graduate students, as well as the Parent Loan for Undergraduate Students (PLUS) Program. The Stafford Loan Program provides low-interest loans to assist students with paying educational costs. Interest rates are determined each year on July 1st. Students with a previous loan will continue to have a variable interest rate. The interest rate will change annually on July 1, with a maximum of 7.9%. These loans must be repaid over a period of time after a student leaves school or drops below half-time enrollment. The funds for these loans come from the federal government.

Federal Direct Stafford Loans (Subsidized and Unsubsidized)

The Subsidized Stafford Loan is awarded based on demonstrated financial need and students do not pay interest on the principal while they are in school. The Unsubsidized Stafford Loan is ***not*** awarded based on demonstrated financial need; however, interest ***is*** charged from the time that the loan funds are disbursed to the student. Students have the option of paying the interest or having the interest added onto the principal. Fees of up to 3% are charged on each loan and these fees are deducted before a student receives the loan funds.

Federal Direct PLUS Loans

PLUS loans enable parents with a good credit history to borrow money to help pay educational expenses for their dependent undergraduate student. The interest rate is set on July 1 and is fixed. Students apply for all Direct loans by filing the FAFSA.

Illinois Student Assistance Commission (ISAC) Financial Aid Programs

Monetary Award Program (MAP)

This program is for undergraduate Illinois residents and provides state grants that do not have to be repaid. To receive a MAP grant, a student must demonstrate financial need, be a resident of Illinois, and be enrolled at an Illinois institution. The MAP grant can only be applied toward tuition and mandatory fees. A student can receive the MAP grant for up to a maximum of 135 credit hours. Students apply for the MAP grant by filing the FAFSA. To receive the maximum grant amount, students must be enrolled in 15 credit hours.

Silas Purnell Illinois Incentive for Access Grant (IIA)

The IIA Program provides a one-time state grant of up to $500 for first-year students who have an expected family contribution (EFC) of zero, which is determined by filing the FAFSA. A student must be enrolled at least half-time in an Illinois institution, be an Illinois resident, and have not yet received a bachelor's degree.

IIT Financial Aid Programs

Most IIT students receive some form of financial assistance. All students who submit a FAFSA are considered for all federal, state and institutional financial aid for which they qualify. IIT grants and most loans are awarded on the basis of demonstrated financial need. In addition, each year a number of talented students receive IIT scholarships that are based on merit. All IIT scholarships may be adjusted upon a student receiving federal and/or state grant funding.

The Office of Admission initially awards IIT scholarships and the Office of Financial Aid administers renewals of the awards. Generally these scholarships are renewable for four years and only apply to undergraduate students who maintain full-time status in undergraduate degree programs. Full-time status is defined as enrollment in 12 or more credit hours of course work at IIT each semester. All IIT scholarships require satisfactory academic progress as defined in the ***IIT Undergraduate Bulletin***. However, some IIT scholarships have additional academic requirements.

The academic records of students who do not meet the requirements of their IIT scholarships are reviewed after posting of spring term grades.

Transfer-Student Scholarships

Merit scholarships are awarded to transfer students who have strong college records. Awards are renewable based on grade point average at IIT and reasonable academic progress. All admitted students are reviewed for eligibility.

Athletic Scholarship

As a National Association of Intercollegiate Athletics (NAIA) member, IIT awards athletic scholarships based solely on athletic ability, regardless of need. In compliance with NAIA rules, athletic scholarships are officially made by financial aid officers, upon recommendation of the athletic director. Students with demonstrated financial need will be reviewed for federal, state and other IIT financial aid for which they are eligible. This scholarship may be adjusted upon a student receiving federal and state funding.

IIT Employment Programs

Part-time employment opportunities may be available for students, on- and off-campus. Co-ops, internships and some on-campus jobs are posted in the Career Management Center (CMC) e-Recruiting database. Other on-campus jobs may be announced directly by individual university departments. Students interested in and eligible for employment off-campus in their field of study can get job search assistance from the CMC and must attend an Introduction to Cooperative Education and Internship workshop conducted by the CMC. Workshop schedules are posted at **www.cmc.iit.edu**. Appointments for individual career counseling may be made by calling 312.567.6800. International students (on F1 visa) are restricted to on campus employment for their first academic year of study at any school in the United States. After completing one academic year in the country, students on F1 visa may be eligible for opportunities off-campus (only if related to their field of study) through the Cooperative Education or Summer Internship Programs.

ROTC Programs

IIT offers scholarship supplements to admitted students who have been awarded U.S. Air Force, Army or Naval ROTC scholarships. The scholarship supplements are described at **www.iit.edu/financial_aid/assistance/pdfs/rotc_scholarships.pdf**.

Veterans' Educational Benefits

Students eligible for the Montgomery GI Bill and the Yellow Ribbon Program are eligible for Veterans' Benefits at IIT. Students need to be accepted by IIT and approved by the Department of Veterans Affairs before receiving benefits. Paperwork needs to be completed in the Registrar's Office at IIT's Main Campus to begin the process for obtaining VA tuition benefits. Office visits are by appointment only. For further information or to make an appointment, please contact:

Office of the Registrar, IIT Main Campus
3300 South Federal
Main Building, Room 104
Chicago, IL 60616
registrar@iit.edu
312.567.3100

Continued Eligibility for Financial Assistance

All students receiving federal and/or state financial aid funds must demonstrate satisfactory academic progress toward graduation from IIT. Satisfactory academic progress includes a satisfactory cumulative grade point average and sufficient credit hours earned each semester toward the completion of a degree program. IIT has established a Satisfactory Academic Progress Policy in compliance with federal and state regulations. Failure to comply with IIT's Satisfactory Academic Progress Policy will lead to the student's losing eligibility for financial assistance.

Additional Information

All financial aid awards and scholarships for freshmen, transfer, continuing undergraduate, and all graduate students (excluding law, graduate business and MPA students) are processed by the IIT Main Campus Office of Financial Aid. Students should submit all information regarding financial assistance to: Office of Financial Aid, 3300 S. Federal St., Chicago, IL 60616 (telephone 312.567.7219). The office is open from 8:30 a.m. to 5 p.m., Monday through Friday.

Educational Expenses

All University mandatory and non-mandatory charges are published regularly in official University publications including electronic mail and web site postings. For a complete listing of current tuition, fees, and other charges go to **www.iit.edu/bursar**, then select Tuition and Fees. The University regrets that continually rising costs do not permit it to guarantee that published charges will not change. Students and parents should anticipate periodic increases in the future.

Undergraduate Tuition

Undergraduates registered for 12 credit hours or more are considered full-time and will be charged at the full-time tuition rate. Part-time undergraduates registered for fewer than 12 credit hours will be charged at the per credit hour part-time tuition rate.

Enrollment Deposit

Each student admitted as a full-time degree-seeking 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 in class for the initial semester of enrollment.

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.

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 **www.iit.edu/bursar**, then select Tuition and Fees.

Books and Supplies

Books and supplies are available at the University bookstores. Costs for books and supplies can differ significantly depending upon the field of study. Most undergraduate students can expect to spend at least $1,000 per year for books and supplies (exclusive of drafting equipment, computers, and similar one time purchases). Students in the College of Architecture may spend less on books but substantially more on supplies.

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

Payment of all term charges to the University are due on the first day of classes each term. The University offers a number of payment plan options allowing students to pay out-of-pocket tuition cost in installments. The latest tuition and fee information as well as payment plan information can be found on the bursar web site at **www.iit.edu/bursar**. Tuition and fees are payable by check or money order submitted either by mail or in person to the cashier office, 3300 S Federal, Main Building Room 104, Chicago, IL 60616. For your convenience the University has partnered with TouchNet, a third party service provider, to offer online credit card payments. TouchNET accepts American Express, Mastercard, and Discover cards only. TouchNet charges a 2.75% convenience fee on all credit card transactions. Please visit the bursar website for more information regarding credit card payments.

University Refund Policy

Under exceptional circumstances, such as withdrawal for involuntary military service, serious illness or injury, consideration may be given by the university for a refund or credit for unused tuition upon written request to the Office of Undergraduate Academic Affairs. Payments for other charges incurred may be the responsibility of the student at the determination of the university. Refer to the academic calendar at **www.iit.edu/registrar** for the last date to drop with a refund.

Outstanding Debts

A hold restricting registration and other services is placed on a student's record when that student is delinquent in fulfilling his or her financial obligation to the university. A student will be considered delinquent when his or her account is not current according to established university policies and payment due dates. Students with outstanding University debts may be suspended from current term classes. Students whose accounts are not current will not be allowed to register or attend classes for any subsequent term. Official transcripts and diplomas will not be issued until all financial obligations have been met.

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 families must live in the residence halls. Housing for first-year students is guaranteed through June 1. Residence hall contracts are made for the full academic year, from the first week of classes **in August** until commencement in May. Charges for room and board for 2010 range from $9,233 to $22,042 for the academic year. When a student submits a contract for campus housing, an itemized list of available campus accommodations and rates will be provided. For more information, see the Housing and Residential Services Website: **www.iit.edu/housing**.

Meals

Students living in residence halls contract for a variety of meal plans. Meal plans and meals on a cash basis are available to non-residents. For more information, see the Housing and Residential Services Website: **www.iit.edu/housing**.

Housing Prepayment Fee

An initial $600 nonrefundable payment, which applies in full to charges for room and board, must be submitted to Housing and Residential Services by June 1 for fall semester applicants or by December 1 for spring semester applicants. Housing prepayment is only required of returning students.

Commuting Students

A student living at home and commuting will spend an estimated annual average of $2,000 on living costs at home and for meals on campus, and approximately $1,800 for travel.

Miscellaneous Expenses

Miscellaneous personal and recreational expenses are estimated at $2,100 for the academic year. These figures are used in computing the official financial aid budget.

Married Students

There are living units in three high-rise apartment buildings on campus. These units range from studio to three-bedroom apartments and are not air-conditioned. Leases are available to married students and single full-time graduate students if space is available. Rentals for unfurnished apartments, including all utilities except telephone and cable T.V. range from approximately $855 to $1,594 per month. Applications for campus housing should be submitted to Housing and Residential Services well in advance. A $50 non-refundable application fee is required when applying for an apartment.

Academic Programs

Undergraduate Curricula at IIT

IIT 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. General education requirements are described on page 25. Specific degree requirements are described in the departmental listings beginning on page 26. For minors, see pages 158–162.

Undeclared Majors

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

Department, Degrees and Certificates

Applied Mathematics Department

- Bachelor of Science in Applied Mathematics

College of Architecture

- Bachelor of Architecture

Biological, Chemical, and Physical Sciences Department

- Bachelor of Science in Biochemistry
- Bachelor of Science in Biology
- Bachelor of Science in Chemistry
- Bachelor of Science in Molecular Biochemistry and Biophysics
- Bachelor of Science in Physics
- Certificate in Premedical Sciences

Biomedical Engineering Department

- Bachelor of Science in Biomedical Engineering

Stuart School of Business

- Bachelor of Science in Business Administration
- Bachelor of Science in Business Administration and Applied Science

Chemical and Biological Engineering Department

- Bachelor of Science in Chemical Engineering

Civil, Architectural, and Environmental Engineering Department

- Bachelor of Science in Civil Engineering
- Bachelor of Science in Architecture Engineering
- Bachelor of Science in Engineering Management
- Certificate in Engineering Graphics and CAD

Computer Science Department

- Bachelor of Science in Computer Science
- Bachelor of Science in Computer Information Systems

Electrical and Computer Engineering Department

- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Computer Engineering

Lewis Department of Humanities

- Bachelor of Science in Humanities
- Bachelor of Science in Journalism of Technology, Science and Business
- Bachelor of Science in Professional and Technical Communication

Industrial Technology and Management Department – School of Applied Technology

- Bachelor of Industrial Technology and Management
- Certificate in Industrial Technology and Management

Information Technology and Management Department – School of Applied Technology

- Bachelor of Information Technology and Management

Mathematics and Science Education Department

- Mathematics and Science Education Secondary Science or Mathematics Teaching Certification

Mechanical, Materials, and Aerospace Engineering Department

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

Institute of Psychology

- Bachelor of Science in Psychology
- Certificate in Industrial Training

Social Sciences Department

- Bachelor of Science in Political Science

General Education Requirements

The general education program is designed to ensure that all IIT graduates have a basic understanding of certain essential areas of knowledge. *The general education program sets minimal requirements.* Most degree programs require additional courses in these areas. These additional course requirements may be found in the departmental listings. General education requirements will not be waived. Substitutions may be considered upon written request to the Office of Undergraduate Academic Affairs. Approval will be granted only to individual students and then, only under extraordinary circumstances.

A. Writing and Communications

IIT recognizes the importance of critical thinking, writing, and oral communication in all academic pursuits and in professional practice. IIT is therefore 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. Students who have not received transfer or AP credit for COM 101 at IIT must take the IIT English Proficiency Examination before beginning classes at IIT. Within their first year at IIT, students who do not pass the IIT English Proficiency Examination must demonstrate basic writing proficiency by passing a composition course at IIT. This requirement applies to all students enrolling for an undergraduate degree.
2. Students must complete a minimum of 42 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) 15 hours in major courses.
   (b) 15 hours in non-major courses.

   Full-time students should enroll in two **(C)**-designated courses, and part-time students should enroll in one **(C)**-designated course each academic year.
3. Students must seek help from the IIT Writing Center (see page 271) when referred by course instructors or academic advisors.

B. Mathematics: 5 credit hours

The five credit hours must be MATH 119 or above. BUS 221 and PSYC 203 also satisfy this requirement.

C. Computer Science: 2 credit hours

All students must take CS 105, 115, 116, 201, or ARCH 125 or a computer science course at the 200-level or above.

D. Humanities and Social or Behavioral Sciences: 21 credit hours, subject to minimum requirements in each area as specified below:

1. Humanities: a minimum of nine credit hours. Courses that satisfy this requirement are marked with an **(H)** in this bulletin. The courses must be distributed as follows:
   (a) All students must take HUM 102, 104, or 106.
   (b) At least two courses marked with an **(H)** at the 300-level or above. Students may use foreign language courses at the intermediate and advanced level to fulfill 300-level requirements.
2. Social or Behavioral Sciences: a minimum of nine credit hours. Courses that satisfy this requirement are marked with an **(S)** in this bulletin. The courses must be distributed as follows:
   (a) At least two courses on the 300-level or above.
   (b) Courses from at least two different fields.
   (c) At least six credits in a single field.

E. Natural Science or Engineering: 11 credit hours

This component may be satisfied by courses in engineering, biology, chemistry and physics, or by courses in architecture and psychology marked with an **(N)**. These courses must be distributed as follows:

1. Two sequential natural science or engineering courses in a single field. (CHEM 124 with MS 201 satisfies this requirement.)
2. At least one natural science or engineering course in a second area.

F. Introduction to the Profession: 2 credit hours

All students must complete these courses in their first year. Students entering with 30 hours or more of transfer credit may have this requirement waived with departmental approval. If waived, the total credit hours required for the degree must still be satisfied.

G. Interprofessional Projects (IPRO): 6 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.

Applied Mathematics

Department Web site: www.iit.edu/csl/am

Applied mathematics is mathematics created in response to problems in science, engineering, and society. Applied mathematicians work on a wide variety of topics, such as the methods for multi-criteria decision making (requiring probability/statistics, analysis, optimization) and the analysis of liquid flow around solids (including computational methods and analysis). Undergraduate study in applied mathematics at IIT incorporates foci in four areas of modern applied mathematics: applied analysis, computational mathematics, discrete applied mathematics, and stochastic analysis. These areas of study both support IIT's broad range of professional degree programs and comprise a specialized Bachelor of Science degree in modern applied mathematics.

The objectives of the Applied Mathematics program are to prepare students for careers that utilize mathematics to address problems in science, engineering, and society and to prepare students for graduate study in mathematics.

A faster and, if preferred, more research oriented program leading to a dual Bachelor of Science/Master of Science in Applied Mathematics is also an option, especially for incoming students who have taken advanced courses in high school, or students who are keen on doing research and continuing for graduate studies. Two sample programs, a four-and-1/2-year plan and a five-year plan, are provided on pages 34 and 35, respectively. In the sample programs, it is assumed that students will take at most one summer course during the entire program.

Students with an applied mathematics background are prepared for jobs in the insurance industry, electronics and computer manufacturing businesses, logistic companies, pharmaceutical firms, etc. The program's flexibility allows students to assemble a portfolio of courses that will satisfy both intellectual needs and career preparation.

The degree program includes a required minor consisting of five related courses (at least 15 semester hours) in an area outside of applied mathematics. A minor in business, computer science or one of the engineering disciplines prepares the student to enter the job market in business or government.

Faculty

Chair
Fred J. Hickernell
Room 208B E1
312.567.8983

Associate Chair
Director of Undergraduate Studies
Gregory Fasshauer
Room 208A E1
312.567.3149

Professors
Bielecki, Duan (Director, Laboratory for Stochastics and Dynamics), Edelstein, Fasshauer, Hickernell, Nair (jointly with Mechanical, Materials, and Aerospace Engineering), Reingold (jointly with Computer Science)

Associate Professors
Adler, X. Li, Lubin, Pelsmajer, Rempfer (jointly with Mechanical, Materials, and Aerospace Engineering)

Assistant Professors
Cialenco, Ellis, Kang, Kaul, S. Li

Senior Lecturers
Maslanka, Sitton, Tier

Faculty Emeriti
Bernstein, Byrne, Darsow, DeCicco, Erber, Frank, Heller, McMorris, Pearson, Sklar, Stueben

Bachelor of Science in Applied Mathematics

Required Courses	Credit Hours
Applied Mathematics Requirements MATH 100, 151, 152, 230, 251, 252, 332, 350, 400, 402, (430 or 454), 475	41
Applied Mathematics Electives*	18
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Minor Requirement Five related courses from an area outside of Applied Mathematics.	15
Interprofessional Projects	6
Computer Science Requirements (CS 115 and 116) or (CS 105 and 201)	4
Science Requirement PHYS 123	4
Science Electives	10
Free Electives	9
Total Hours	**128**

* Applied mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests and course availability should be determining factors in this selection process. The optional specializations on pages 29–31 may also serve as a guide to applied mathematics elective selection.

Applied Mathematics Curriculum

Semester 1		Credits
MATH 100	Introduction to the Profession	2
MATH 151	Calculus I	5
CS 115	Object-Oriented Programming I	2
Science Elective		3
Humanities 100-level Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**18**

Semester 2		Credits
MATH 152	Calculus II	5
MATH 230	Introduction to Discrete Mathematics	3
CS 116	Object-Oriented Programming II	2
PHYS 123	General Physics I	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 251	Multivariate & Vector Calculus	4
MATH 332	Matrices	3
Minor Elective		3
Science Elective		4
Free Elective		3
Total Hours		**17**

Semester 4		Credits
MATH 252	Introduction to Differential Equations	4
MATH 350	Intro to Computational Mathematics	3
Minor Elective		3
Science Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 5		Credits
MATH 430	Applied Algebra	
OR		3
MATH 454	Graph Theory	
MATH 475	Probability	3
Applied Mathematics Elective*		3
Minor Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
MATH 402	Complex Analysis	3
IPRO 497	Interprofessional Project I	3
Applied Mathematics Elective*		3
Applied Mathematics Elective*		3
Minor Elective		3
Total Hours		**15**

Semester 7		Credits
MATH 400	Real Analysis	3
Minor Elective		3
Applied Mathematics Elective*		3
Humanities or Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 8		Credits
IPRO 497	Interprofessional Project II	3
Applied Mathematics Elective*		3
Applied Mathematics Elective*		3
Humanities or Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **128**

* Applied Mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on pages 29–31 may also serve as a guide to applied mathematics elective selection.

Applied Mathematics Specializations

In addition to the general B.S. degree in Applied Mathematics, the department offers six 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
- education
- industrial research
- graduate school

Choosing any of the following specializations is **optional**.

Specialization in Mathematical Finance
Program advisor: 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 Applied Mathematics Department. The objective of the MMF program is to provide individuals interested in pursuing careers in the finance industry with advanced education in theoretical, computation and business aspects of relevant quantitative methodologies.

A **Business** or **Entrepreneurship minor** is required (see pages 158–162).

Students must take:

MATH 475	Probability
MATH 476	Statistics
MATH 478	Numerical Methods for Differential Equations
MATH 481	Introduction to Stochastic Processes
MATH 485	Introduction to Mathematical Finance

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

Closely related courses which are recommended as additional electives include:

MATH 461	Fourier Series and Boundary Value Problems
MATH 477	Numerical Linear Algebra
MATH 483	Design and Analysis of Experiments
MATH 486	Mathematical Modeling
MATH 489	Partial Differential Equations

Specialization in Math Education
Program Advisor: G. Fasshauer

Completion of the following 24 credit hour **Mathematics and Science Education minor** will prepare students for the Illinois State Certification in Secondary Mathematics (grades 6-12) and Secondary Science: Biology, Chemistry, Physics (grades 6-12).

MSED 200	Analysis of Classrooms
MSED 250	Middle and Secondary Curriculum/Foundations
MSED 300	Instructional Methods/Strategies I
MSED 320	Inquiry and Problem Solving in Mathematics and Science
MSED 350	Informal Education Practicum and Seminar
MSED 400	Instructional Methods/Strategies II
MSED 450	Professional Internship

Students must take:

MATH 420 Geometry
OR
MATH 453 Combinatorics

MATH 430	Applied Algebra
MATH 454	Graph Theory
MATH 475	Probability
MATH 476	Statistics

MATH 430 or 454, and 475 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 300	Perspectives in Analysis
MATH 420	Geometry*
MATH 453	Combinatorics*
MATH 486	Mathematical Modeling

*Only if not already counted as a required course.

Specialization in Applied Analysis

Program advisor: 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.

Students must take:

MATH 400	Real Analysis
MATH 402	Complex Analysis
MATH 461	Fourier Series and Boundary Value Problems
MATH 488	Ordinary Differential Equations and Dynamical Systems
MATH 489	Partial Differential Equations

MATH 400 and 402 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405	Iteration and Chaos
MATH 478	Numerical Methods for Differential Equations
MATH 486	Mathematical Modeling

Recommended minors include: Physics or an engineering minor.

Specialization in Computational Mathematics

Program Advisor: 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.

Students must take:

MATH 350	Introduction to Computational Mathematics
MATH 435	Linear Optimization
OR	
MATH 461	Fourier Series and Boundary Value Problems
MATH 476	Statistics
MATH 477	Numerical Linear Algebra
MATH 478	Numerical Methods for Differential Equations

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

Closely related courses which are recommended as additional electives include:

MATH 405	Iteration and Chaos
MATH 435	Linear Optimization*
MATH 461	Fourier Series and Boundary Value Problems*
MATH 486	Mathematical Modeling
MATH 488	Ordinary Differential Equations and Dynamical Systems
MATH 489	Partial Differential Equations

*Only if not already counted as a required course.

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

Specialization in Discrete Applied Mathematics

Program Advisor: 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.

Students must take:

MATH 332 Matrices
MATH 430 Applied Algebra
MATH 435 Linear Optimization
MATH 453 Combinatorics
MATH 454 Graph Theory

MATH 332 and MATH 430 or 454 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Closely related courses which are recommended as additional electives include:

MATH 405 Iteration and Chaos
MATH 410 Number Theory

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

Specialization in Stochastics

Program Advisor: I. Cialenco

Stochastics at IIT 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.

Students must take:

MATH 475 Probability
MATH 476 Statistics
MATH 481 Introduction to Stochastic Process
MATH 485 Introduction to Mathematical Finance
MATH 488 Ordinary Differential Equations and Dynamical Systems

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

Closely related courses which are recommended as additional electives include:

MATH 453 Combinatorics
MATH 483 Design and Analysis of Experiments
MATH 486 Mathematical Modeling

Applied Mathematics Dual Degree Program

Dual Bachelor of Science/Master of Science in Applied Mathematics

A typical MS degree requires 2 years after completion of the BS degree. This dual degree program can potentially reduce the time to an MS degree by up to at least a year for select students with sufficient AP or transfer credits. The program requires that students complete the credit hour requirements for both degrees. However, by taking advantage of credits already earned when entering IIT, a student can - instead of graduating from IIT in less than four years with only a BS degree - stay at IIT for four and a half to five years and take graduate-level courses that will be counted toward earning a graduate degree. The core and course requirements for each of the degrees are not affected by this dual degree option.

Some advantages of the combined degree program are:

- Provide talented students an opportunity to obtain both a BS and an MS degree within five years, cutting the length of an MS degree by up to at least one year.
- Offer students a chance to link advanced undergraduate course work with graduate course work.
- Provide students with research opportunities during their early years of study.
- Prepare academically strong students for a Ph.D. program in Applied Mathematics or Mathematics at an elite graduate school.
- Offer an enhanced academic environment with accelerated learning.
- Simplify the graduate admissions procedure.

Admission and Continuation

Students satisfying the following requirements are eligible to apply to the dual BS/MS program:

- The student must have completed four semesters of full-time study in the BS program, or have accumulated at least 80 credit hours toward the degree (including transfer credits).
- The student must have an overall GPA of 3.25 or better.
- the student must have an applied mathematics major GPA of 3.5 or better.

Applications must be accompanied by an official transcript and three letters of recommendation. At least two letters of recommendation must come from applied mathematics faculty members. These two letters shall attest to readiness and probable success in completing the graduate program. GRE scores are not required for this dual degree program. Applications are reviewed and processed by the Graduate Director of the department.

A student must maintain a graduate GPA of 3.00 or better in order to continue the combined program. A student in the program may choose to obtain a BS degree only and not complete the requirements of the MS degree. In that case, the credit hours in graduate-level math courses will be counted toward the BS degree requirements as applied mathematics electives or as free electives.

Financial Assistance

Students may be offered Research Assistantships at any time during the program. Students in the program will be eligible for all scholarships and financial aid packages for undergraduates, as long as they have not completed their BS degree. They are eligible for Dean's Fellowships when they have obtained the equivalent credit requirement for a BS degree and still have at least 18 credit hours to complete the combined degree program. They can also apply for financial loans for graduate students once they obtain the BS degree. Furthermore, students in the program can apply for external funding. For example, they can apply for an NSF Graduate Fellowship in their fourth year and fifth year of the five-year program.

In the following sample programs, it is assumed that students take at most one summer course during the program. Students may finish earlier if they take more courses in summer terms. Students may also participate in the research projects being carried out in the department, possibly MATH 491 (UG independent study) and continuing with MATH 591 (MS thesis).

B.S./M.S. Dual Degree in Applied Mathematics Program

For the four-and-1/2-year program, it is assumed that the student has completed 17 semester hours of AP credit. In order to be specific, for the provided sample program on page 34, it is also assumed that these AP credits correspond to MATH 151, MATH 152, PHYS 123, and a 3-credit-hour Science Elective course.

For the 5-year program, it is assumed that the student has completed 8 semester hours of AP credit. In order to be specific, for the provided sample program on page 35, it is also assumed that these AP credits correspond to MATH 151, and a 3-credit hour Science Elective course.

There are a few dual-delivery courses in the Applied Mathematics department, such as MATH 477/577, MATH 478/578, etc. Students in the program are not allowed to take these dual-delivery courses at both the 400-level and 500-level.

For the graduate degree, students must take at least two sequences out of four core areas, which are Applied Analysis (MATH 500/501), Discrete Applied Mathematics (MATH 553/554), Computational Mathematics (MATH 577/578), and Stochastics (MATH 543/544).

B.S./M.S. Dual Degree in Applied Mathematics Program ($4\frac{1}{2}$ Years)

This sample program assumes the student receives Advanced Placement credit for MATH 151, MATH 152, PHYS 123, and a 3-hour science elective for a total of 17 credit hours.

Semester 1	Credits
MATH 100 Introduction to the Profession	2
MATH 251 Multivariate & Vector Calculus	4
MATH 252 Introduction to Differential Equations	4
CS 115 Object-Oriented Programming I	2
Humanities 100-level Elective	3
Humanities or Social Sciences Elective	3
Total Hours	**18**

Semester 2	Credits
MATH 230 Introduction to Discrete Mathematics	3
MATH 350 Intro to Computational Mathematics	3
CS 116 Object-Oriented Programming II	2
Minor Elective	3
Science Elective	4
Humanities or Social Sciences Elective	3
Total Hours	**18**

Semester 3	Credits
MATH 332 Matrices	3
MATH 400 Real Analysis	3
MATH 475 Probability	3
Minor Elective	3
Science Elective	4
Humanities or Social Sciences Elective (300+)	3
Total Hours	**19†**

Semester 4	Credits
MATH 402 Complex Analysis	3
Applied Mathematics Elective*	3
Applied Mathematics Elective*	3
Minor Elective	3
Humanities or Social Sciences Elective (300+)	3
IPRO 497 Interprofessional Project I	3
Total Hours	**18**

Semester 5	Credits
Core Sequence I–A**	3
MATH 430 Applied Algebra	
OR	3
MATH 454 Graph Theory	
Applied Mathematics Elective*	3
Minor Elective	3
Humanities or Social Sciences Elective (300+)	3
Total Hours	**15**

Semester 6	Credits
Core Sequence I–B**	3
Applied Mathematics Elective*	3
Applied Mathematics Elective (500+)*	3
Minor Elective	3
Free Elective	3
IPRO 497 Interprofessional Project II	3
Total Hours	**18**

Semester 7	Credits
Core Sequence II–A**	3
Applied Mathematics Elective*	3
Applied Mathematics Elective*	3
Applied Mathematics Elective (500+)*	3
Free Elective	3
Total Hours	**15**

Semester 8	Credits
Core Sequence II–B**	3
Applied Mathematics Elective (500+)*	3
Applied Mathematics Elective (500+)*	3
Humanities or Social Sciences Elective (300+)	3
Free Elective	3
Total Hours	**15**

Semester 9	Credits
Graduate Course	3
Graduate Course	3
MATH 591 MS Thesis	3
Total Hours	**9**

Total Credit Hours 162

* Applied Mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process.

** Students must complete 2 of the following core sequences: Applied Analysis (MATH 500 and 501), Discrete Applied Mathematics (MATH 553 and 554), Computational Mathematics (MATH 577 and 578), or Stochastics (MATH 543 and 544).

† Students must have approval from the Dean of the College of Science and Letters to take more than 18 credit hours in a semester.

B.S./M.S. Dual Degree in Applied Mathematics Program (5 Years)

This sample program assumes the student Advanced Placement credit in MATH 151 and a 3-hour science elective for a total of 8 credit hours.

Semester 1		Credits
MATH 100	Introduction to the Profession	2
MATH 152	Calculus II	5
CS 115	Object-Oriented Programming I	2
Humanities 100-level Elective		3
Humanities or Social Sciences Elective		3
Science Elective		4
Total Hours		**19†**

Semester 2		Credits
MATH 230	Introduction to Discrete Mathematics	3
MATH 251	Multivariate & Vector Calculus	4
CS 116	Object-Oriented Programming II	2
PHYS 123	General Physics I	4
Humanities or Social Sciences Elective		3
Total Hours		**16**

Summer		Credits
MATH 252	Introduction to Differential Equations	4
Total Hours		**4**

Semester 3		Credits
MATH 332	Matrices	3
MATH 430	Applied Algebra	
OR		3
MATH 454	Graph Theory	
Applied Mathematics Elective*		3
Minor Elective		3
Science Elective		4
Total Hours		**16**

Semester 4		Credits
MATH 350	Intro to Computational Mathematics	3
MATH 402	Complex Analysis	3
Applied Mathematics Elective*		3
Minor Elective		3
Humanities or Social Sciences Elective (300+)		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 5		Credits
MATH 400	Real Analysis	3
MATH 475	Probability	3
Applied Mathematics Elective*		3
Minor Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
Applied Mathematics Elective*		3
Applied Mathematics Elective*		3
Applied Mathematics Elective (500+)*		3
Minor Elective		3
Free Elective		3
IPRO 497	Interprofessional Project I	3
Total Hours		**18**

Semester 7	Credits
Core Sequence I–A**	3
Core Sequence II–A**	3
Applied Mathematics Elective*	3
Minor Elective	3
Free Elective	3
Total Hours	**15**

Semester 8		Credits
Core Sequence I–B**		3
Core Sequence II–B**		3
Humanities or Social Sciences Elective (300+)		3
Free Elective		3
IPRO 497	Interprofessional Project II	3
Total Hours		**15**

Semester 9	Credits
Graduate Course	3
Graduate Course	3
Graduate Course	3
Total Hours	**9**

Semester 10		Credits
Graduate Course		3
Graduate Course		3
MATH 591	MS Thesis	3
Total Hours		**9**

Total Credit Hours **162**

* Applied Mathematics electives are to be chosen after consultation with an academic advisor. Student goals, interests, and course availability should be determining factors in this selection process.

** Students must complete 2 of the following core sequences: Applied Analysis (MATH 500 and 501), Discrete Applied Mathematics (MATH 553 and 554), Computational Mathematics (MATH 577 and 578), or Stochastics (MATH 543 and 544).

† Students must have approval from the Dean of the College of Science and Letters to take more than 18 credit hours in a semester.

College of Architecture

College Web site: www.iit.edu/arch

Now, in the new century, architecture must fill an ever more demanding role in asserting human values in a rapidly changing, technology-driven and increasingly complex global society. The integration of new construction, along with the conservation of the old, brings together current issues of urban housing, commercial development, infrastructure and transportation, along with critical concerns for energy and a sustainable environment. The resulting cultural values of community development must be adaptable to both domestic and international contexts, and thoughtful to the consequences of what we build.

Drawing strength from its Mies van der Rohe heritage, its key position in the legacy of Modernism, its location in Chicago, and its connections to progressive practitioners and emerging global practices, the College of Architecture offers the professional, five-year Bachelor of Architecture (B.Arch.) degree. Accredited by the National Architectural Accrediting Board (NAAB), this well-established degree program prepares architects to use communication and analytical skills to provide inventive solutions to a broad range of design problems.

The objectives of the B.Arch. program prepare architects to respond to an increasingly complex global condition, within cities and beyond. Informed by humanist ideals, our graduates combine technical expertise and environmental awareness to design and execute individual buildings as well as sensitively planned landscapes at any scale, in any material. Consisting of tenured faculty and practicing architects, our teachers are committed to training and educating a diverse student body for a broad range of professional career opportunities in architecture and the construction industry. Integrating advanced digital technology and design studio training, our program prepares our graduates to:

- Design functional, compelling buildings to meet the needs of a complex, changing world.
- Work collaboratively with allied professionals (engineering, landscape architecture, construction management, planning) to produce quality built environments.
- Enter the profession equipped with an integrated knowledge of complex construction technologies, craftsmanship, materials, and an inspired sense of design excellence.
- Articulate in two-dimensional and three-dimensional visual form a contemporary vision for architectural excellence responsive to the 21st century's cultural, economic, regulatory, environmental, ethical, and material contingencies that condition the built world.
- Take leadership roles throughout their lives to support design excellence, develop technical expertise, advance professional practice, practice ethical integrity, and promote respect for the architect in contemporary society.
- Consider all aspects of the built environment to insure a sustainable and planned integration of architecture with the natural environment and its resources.

To understand architecture in its global context, IIT students are encouraged to travel outside the United States to study modern and historic buildings. Students in their fourth year of B.Arch. studies may pursue several study abroad opportunities. In fall and spring, the College offers a semester of studio and architecture electives in Paris. Student financial aid remains intact for this IIT program. Students admitted to the Paris Program combine their Paris studio and courses with travel throughout Europe as they complete projects derived from contemporary urban landscapes. Students may apply to study abroad programs offered in architecture programs at other universities throughout the world. Pre-approval from the College, the Office of Educational Services, and the International Center is required. The College is expanding relations to partner schools of architecture throughout the world. Each semester, a few advanced studios have been situated for a month in Asia and South America. Students should discuss study abroad options with their academic advisors, assistant dean, and the College's director of international affairs.

The College's roots are firmly embedded in Chicago's architectural history. Creative pioneers like Sullivan, Jenney, Root, Burnham and Wright produced a body of work that established the principles of modern architecture. These architects were inspired by exciting new engineering possibilities, yet they never wavered from the unifying belief in a rich cultural expression of architecture for their time. They also believed in education and, in 1895, combined a course of study in drawing and construction at the Art Institute of Chicago, with the support courses of history, mathematics and engineering from the then Armour Institute of Technology. The catalog for this new program was called the Chicago School of Architecture.

Out of these beginnings, the College's faculty and students continue to engage with complexities that inform architectural education and future practice. As one of the world's greatest cities for the study of architecture, landscape, and architectural engineering, Chicago's built environment and active profession reinforces the College's educational mission. Our teachers are both practitioners and educators. Moreover, S.R. Crown Hall, designed by Mies van der Rohe, is the ultimate space to study architecture. Set within the Mies-designed campus, it has become recognized as one of the most significant buildings of the 20th century.

The curriculum emphasizes digital applications (including Building Information Management), advanced technologies, design and theory, landscape architecture and its relationship to architecture, development and design/build, sustainability and planning, and history/theory/criticism. A dynamic campus center by

Rem Koolhaas and residence hall by Helmut Jahn have energized the historic campus landscape. To meet expanded studio and faculty requirements, the College has adapted important Mies buildings for additional teaching and design/build projects.

With a demonstrated legacy of excellence, IIT Architecture seeks to become a force for designing built environments of high quality through the incorporation of planning, technology, materials, space and formal generation. The responsible integration of these attributes is promoted to accentuate the historical, social, cultural, and environmental imperatives requisite to better society.

Faculty

Dean
John H. and Jeanne M. Rowe Chair
Donna V. Robertson, FAIA
S. R. Crown Hall
312.567.3230

Associate Dean
Peter Beltemacchi
S.R. Crown Hall
312.567.3261

Assistant Dean
Undergraduate Academic Affairs
R. Stephen Sennott
S.R. Crown Hall
312.567.8835

Professors
Elnimeiri, Land, Mallgrave, Robertson

Associate Professors
Beltemacchi, Denison, Flury, Hovey, Krawczyk, Ronan, Schipporeit, Takeuchi, Wetzel

Assistant Professors
Brock, M. Brown, Keller, Kultermann, Osler, B. Riley, Rockey

Studio Professors
Conger-Austin, Durbrow, Horn, Karidis, Krueck, Stutzki

Studio Associate Professors
T. Brown, Felsen, Goodman, Kearns, Kibler, McLeish, Miller, Nagle, Nelson, Pettigrew, Roesch, Wood

Studio Assistant Professors
Peluso, Schachman

Mies van der Rohe Visiting Professor
Werner Sobek

Morgenstern Visiting Critics
Murcutt (2004), deVries (2005), Chipperfield (2006), Herreros (2007), Park (2008), Endres (2009)

Adjunct Professors
Babbin, Baird, Brininstool, Brubaker, Clark, Geiger, Guen, Hamill, Hartray, Licata, Metter, Peterson, Phillips, C. Ross Barney, Roszak, Smietana, Uhlir, Wimer, Wolff, Womack, Woodhouse

Adjunct Associate Professors
Anand, Brooke, Clair, Cook, Danly, Desalvo, Ford, Gang, Glynn, Goldsmith, Greven, Grzeslo, Hickey, Jacobs, Kindel, Koo, Kriegshauser, LaJeune, Lehman, Newman, Paradiso, Peters, Sennott, Soncrant, Tinucci, Weir, Williams, Yurko

Adjunct Assistant Professors
Attali, Canna, Emmick, D. Greenberg, L. Greenberg, Hall, Hogue, Horn, Humer, Issa, Johnson, Jones, Klymson, Kowalczyk, Kujawa, Shojaie, Teer, Vesselinovitch, Vogler

Distinguished Research Professor
Sobel

Research Professors
Vittori, Witte

Research Associate
Ko

Faculty Emeriti
Sharpe, Utsunomiya

Professional Degrees

The undergraduate professional degree program at IIT 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 within a coordinated three-year foundation studio sequence. Each of the three years is team taught to horizontally integrate all courses within each year and vertically sequence learning experiences. This professional background prepares students for the last two years of advanced design studios focused on spatial awareness, comprehensive building design, and the design of large building complexes.

IIT 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, IIT 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 IIT 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 a 6-year, 3-year, or 2-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 6-year terms of accreditation with the NAAB.

The four-year pre-professional degree, where offered, is not accredited by NAAB. The pre-professional degree is useful to those wishing a foundation in the field of architecture as preparation for either continued education in a professional degree program or for employment options in fields related to architecture. (The College does not offer this four-year pre-professional degree.)

Bachelor of Architecture

Required Courses	Credit Hours
Architecture Requirements ARCH 100, 109, 110, 113, 114, 125, 201, 202, 226, 305, 306, 403, 404, 413, 417, 418, 419, 420, 423	84
Building Science and Structural Requirements ARCH 230, 334, 335	9
Art and Architectural History Requirements AAH 119, 120, ARCH 321	9
Architectural History Elective	3
City and Regional Planning Requirements CRP 201, 465	6
Mathematics Requirements MATH 119, 122	6
Physics Requirement PHYS 200	4
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Interprofessional Projects (2)	6
Architecture Electives (7)	21
Total Hours	**169**

Architecture Curriculum

Semester 1		Credits
ARCH 113	Architecture Studio I	6
ARCH 100	Introduction to Architecture	3
ARCH 109	Freehand Drawing I	2
MATH 119	Geometry for Architects	3
Humanities Elective (100+)		3
Total Hours		**17**

Semester 2		Credits
ARCH 114	Architecture Studio II	6
ARCH 110	Freehand Drawing II	2
MATH 122	Introduction to Mathematics II	3
ARCH 125	Introduction to Architectural Computing	3
Humanities or Social Sciences Elective (100+)		3
Total Hours		**17**

Semester 3		Credits
ARCH 201	Architecture Studio III	5
AAH 119	History of World Architecture I	3
ARCH 226	CAD in Practice	3
PHYS 200	Basic Physics for Architects	4
Total Hours		**15**

Semester 4		Credits
ARCH 202	Architecture Studio IV	6
ARCH 230	Architecture and Structure	3
AAH 120	History of World Architecture II	3
CRP 201	The Dwelling	3
Social Sciences Elective (200+)		3
Total Hours		**18**

Semester 5		Credits
ARCH 305	Architecture Studio V	6
ARCH 403	Building Systems for Architects I	3
ARCH 423	Architectural Programming	3
ARCH 334	Frame Structural System and Steel	3
ARCH 321	History of Modern Thought	3
Total Hours		**18**

Semester 6		Credits
ARCH 306	Architecture Studio VI	6
ARCH 404	Building Systems for Architects II	3
ARCH 335	Reinforced Concrete/Continuous Struct	3
CRP 465	The Ecological Basis of Planning	3
Architecture Elective		3
Total Hours		**18**

Semester 7		Credits
ARCH 417	Architecture Studio VII	6
Architecture Elective		3
Architecture Elective		3
History of Architecture Elective		3
Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 8		Credits
ARCH 418	Architecture Studio VIII	6
IPRO 497	Interprofessional Project I	3
Architecture Elective		3
Humanities Elective (300+)		3
Total Hours		**15**

Semester 9		Credits
ARCH 419	Architecture Studio IX	6
IPRO 497	Interprofessional Project II	3
Architecture Elective		3
Architecture Elective		3
Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 10		Credits
ARCH 420	Architecture Studio X	6
ARCH 413	Architecture Practice	3
Architecture Elective		3
Humanities Elective (300+)		3
Total Hours		**15**

Total Credit Hours **169**

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 advisors, 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 (15 credit hours) for each specialization are met by a combination of required core courses, advanced studios, and architecture electives. Prior approval for electives is required.

Architectural History and Theory

In addition to the required elective in the history of architecture, students must take:

AAH 119	History of World Architecture I
AAH 120	History of World Architecture II
ARCH 321	History of Modern Thought in Architecture

Students must also take three elective history of architecture courses (AAH, ARCH, or LA) approved by the advisor.

City and Regional Planning

Students must take:

CRP 201	The Dwelling
CRP 465	The Ecological Basis of Planning

Students must also take three elective city and regional planning courses approved by the advisor.

Design Build

Students must take one of the following courses, a studio in design build:

ARCH 417	Architecture VII
ARCH 418	Architecture VIII
ARCH 419	Architecture IX
ARCH 420	Architecture X - Advanced Studio (Design Build)

Students must also take three elective design build courses approved by the advisor.

Digital Design

Students must take:

ARCH 125	Introduction to Architectural Computing
ARCH 226	Digital Media I - 2D CAD
ARCH 427	Digital Media II - 3D Modeling
ARCH 428	Digital Media III - 3D Animation

Students must also take two elective digital courses approved by the advisor.

Landscape Architecture

Students must take one of the following courses, a studio in landscape architecture:

ARCH 417	Architecture VII
ARCH 418	Architecture VIII
ARCH 419	Architecture IX
ARCH 420	Architecture X - Advanced Studio (Landscape Build)

Students must also take three elective landscape-related architecture courses (ARCH) or landscape architecture (LA) courses approved by the advisor.

Minors and Architectural 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 advisor or a dean, and in consultation with the Office of Educational Services, a select number of courses from other departments may serve as an architecture elective. These have included CRP courses, ID courses in architectural photography, or selected CAE courses related to construction management or civil and architectural engineering. Within the College of Architecture, students may choose architecture elective courses to design a specialized area of study such as advanced CAD presentation, architectural history, or city planning. Students should consult with their academic advisor early in their program of study.

Optional Programs

Architecture students are encouraged to select electives that provide a sequence of 15 credit hours of learning experiences related to a specific interest that will reinforce the curriculum. Such topical fields of study should be chosen early in the student's program in consultation with their academic advisor.

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

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

IIT 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 advisors 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 one and a half more years of study.

Students considering the B.Arch./M.B.A. dual degree program should consult with undergraduate advisors 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, Professional experience in the business world is not required for consideration, allowing B.Arch. students to pursue their M.B.A. degree without interruption. Formal 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 4 M.B.A. courses, or 12 credits, 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. Advisors 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 Civil Engineering Double-Degree Option

Qualified students enrolled at IIT may earn both the Bachelor of Architecture and the Master of Civil Engineering (M.C.E.) Degrees. They must complete preparatory courses for the M.C.E. prior to entry into the combined program. Students who anticipate entry into the combined program and who intend to specialize in structural engineering must successfully complete the following courses as part of their undergraduate program in architecture: MATH 151, MATH 152, MATH 251, PHYS 123, MMAE 200, MMAE 202, CAE 303, CAE 304, CAE 307, CAE 310, CAE 431, and CAE 432.

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

Study Abroad

Architects practice in all parts of the world. Study abroad has a long and important history in the training of architects. The important of foreign study to architectural education is unassailable. The College's desire is to make this essential experience central to each of our students' education. To prepare IIT students for this global exchange, the College of Architecture encourages study abroad and international studies so that our students may examine architecture in a new physical and cultural setting.

The College supports several ways for students to study abroad for a single semester, a summer semester, or an entire academic year. Architecture students may enroll in the College's one-semester Paris Program (fall or spring) or summer study abroad courses, participate in an advanced studio situated in an international city, or enroll in another university's study abroad program. Each global opportunity combine studio-based design work with travel, site visits, and collaborative design with local architects and students.

The College offers numerous summer study abroad courses, open to all college students.

To join study abroad programs at other universities in the United States or other countries, students work with their academic advisor and IIT's International Center staff for admission and pre-approval of courses in architecture and other subjects, including foreign languages.

Change of Major to Architecture (B.Arch.)

Students admitted to IIT 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 requested to submit a personal statement and meet with designated College of Architecture staff to initiate their application and discuss the requirements of the five-year degree. Students must have a minimum cumulative G.P.A. of 3.0 for consideration. Admission is for the fall semester only due to the studio sequence.

Biological, Chemical and Physical Sciences

Department Web site: www.iit.edu/csl/bcps

In an ever more technological world, a substantive understanding of the sciences is a requirement for many professions, including careers in science, education, health professions and, increasingly, areas such as law and business. In the latter cases, a technical background can serve as a unique and sought after qualification.

The Department of Biological, Chemical and Physical Sciences offers traditional Bachelor of Science (B.S.) degrees in each area of biology, chemistry and physics, as well as interdisciplinary B.S. degrees in Biochemistry, and Molecular Biochemistry and Biophysics (M.B.B.). All five programs serve as a solid foundation for entry into graduate and medical schools and for jobs in both the government and the private sector. They are also designed to fulfill the requirements for our special medical and optometry degree programs.

The department also provides specialized B.S. degree programs that integrate the sciences with law, business, and secondary education. These include programs which offer joint admission to IIT's Chicago-Kent College of Law, the Stuart School of Business Financial Markets Program, and the Department of Mathematics and Science Education.

Details of the five traditional programs, as well as the specialized degree programs, can be found on the following pages, the Department of Mathematics and Science Education section (pages 234–125), and in the Special Programs section (pages 162–170).

Biology Faculty

Associate Chair
Ben Stark
Room 182B Life Sciences
312.567.3488

Professors
Cork, Irving, McCormick, Mehta, Stark

Associate Professors
Howard, Menhart, Xiang

Assistant Professors
Dushay, Orgel, C. Zhang, W. Zhang

Senior Lecturers
Bekyarova, Spink

Adjunct Professor
Rubenstein

Research Professors
Cummings, Kilbane, Palumbo, Webster

Faculty Emeriti
Bretz, Erwin, Grecz, Jasper, Roth, Webster

Chemistry Faculty

Associate Chair
Rong Wang
Room 182D Life Sciences
312.567.3121

Professors
P.Y. Johnson, Khan, Lykos, Mandal, Schug

Associate Professors
Chong, R. Wang

Assistant Professors
Bishnoi, Cage, Hock, Unni

Senior Lecturer
Nguyen

Lecturer
Calcaterra

Adjunct Professor
Cwik

Research Professor
Stetter

Research Assistant Professor
Varma

Faculty Emeriti
Eisenberg, Fanta, Filler

Physics Faculty

Associate Chair
Grant Bunker
Room 182A Life Sciences
312.567.3385

Pritzker Professor of Science
Lederman

Professors
Betts, Bunker, Kallend*, Kaplan, Morrison, Scott, Segre, White, Zasadzinski

Associate Professors
Coffey, Spentzouris

Assistant Professors
Gidalevitz, Sullivan, Terry, Torun

Senior Lecturers
Friedman, Glodowski

Research Professor
Mancini

Research Associate Professors
Barrea, Gore

Research Assistant Professors
Chattopadhyay, Khelashvili, Shibata

Faculty Emeriti
Burnstein, Erber, Hauser, P.W. Johnson, Malhiot, Rubin, Spector, Zwicker

* Jointly with Department of Mechanical, Materials and Aerospace Engineering

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 with opportunities to construct their degree program to best suit their interests.

Bachelor of Science in Biochemistry

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 445, 446, 451 (or CHEM 451), 495	23/25
Chemistry Requirements CHEM 124, 125, 237, 239, 240, 247, 343, 344, 451 (or BIOL 451), 485	28/31
Biochemistry Requirements BIOL 401, 402, 404	9
Technical Electives	11/12
Physics Requirements PHYS 123, 221	8
Mathematics Requirements MATH 151, 152, 251, 425	17
Interprofessional Projects	6
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Total Hours	**127-129**

Biochemistry Curriculum

Semester 1		Credits
BIOL 100	Introduction to the Profession	2
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
Humanities 100-level Elective		3
Total Hours		**16**

Semester 3		Credits
BIOL 214	Genetics	3
CHEM 237	Organic Chemistry I	4
PHYS 123	General Physics I	4
MATH 251	Multivariate & Vector Calculus	4
CS 105	Intro to Computer Programming I	2
Total Hours		**17**

Semester 4		Credits
BIOL 210	Microbiology	3
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Laboratory	2
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 5		Credits
CHEM 343	Physical Chemistry I	3
BIOL 445	Cell Biology	3
CHEM 247	Analytical Chemistry	3
Technical Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 6		Credits
CHEM 344	Physical Chemistry II	4
CHEM 485	Chemistry Colloquium	1
MATH 425	Statistical Methods	3
IPRO 497	Interprofessional Project I	3
Technical Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 7		Credits
BIOL 401	Introductory Biochemistry	3
BIOL 446	Cell Biology Lab	3
BIOL 495	Biology Colloquium	1
Technical Elective		3
BIOL 451	Literature in Biology	
OR		2/3
CHEM 451	Modern Techniques in Chem Lit	
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15/16**

Semester 8		Credits
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
IPRO 497	Interprofessional Project II	3
Technical Elective		2/3
Humanities or Social Sciences Elective (300+)		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17/18**

Total Credit Hours **127-129**

Biology

The undergraduate biology degree at IIT 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 IIT'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.

Bachelor of Science in Biology

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 225, 401, 402, 404, 430, 445, 446, 451, 495 (2)	40
Biology Electives	12
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152, 425	13
Chemistry Requirements CHEM 124, 125, 237, 239, 247	18
Physics Requirements PHYS 123, 221, 224	11
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Free Elective	3
Total Hours	**126**

Biology Curriculum

Semester 1		Credits
BIOL 100	Introduction to the Profession	2
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
Humanities 100-level Elective		3
Total Hours		**16**

Semester 3		Credits
BIOL 214	Genetics	3
CHEM 237	Organic Chemistry I	4
PHYS 123	General Physics I	4
Humanities or Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
BIOL 210	Microbiology	3
BIOL 225	Microbiology Laboratory	2
CHEM 239	Organic Chemistry II	3
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 5		Credits
BIOL 401	Introductory Biochemistry	3
BIOL 430	Animal Physiology	3
CHEM 247	Analytical Chemistry	3
PHYS 224	General Physics III	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
IPRO 497	Interprofessional Project I	3
CS 105	Intro to Computer Programming I	2
MATH 425	Statistical Methods	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 7		Credits
BIOL 451	Literature in Biology	2
BIOL 445	Cell Biology	3
BIOL 446	Cell Biology Laboratory	3
BIOL 495	Biology Colloquium	1
Biology Elective		3
Biology Elective		3
Total Hours		**15**

Semester 8		Credits
BIOL 495	Biology Colloquium	1
IPRO 497	Interprofessional Project II	3
Biology Elective		3
Biology Elective		3
Humanities or Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**16**

Total Credit Hours **126**

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 IIT 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. Our requirement for participation in an original research project also provides the necessary experience for entrance into graduate school in one of the chemical sciences. In addition, the IIT program in chemistry provides excellent preprofessional training for careers in medicine (see page 166 and **www.iit.edu/∼premed**), law, business, and other areas of science and healthcare. IIT has developed a very flexible curriculum which, in addition to our standard bachelor's degree in chemistry, gives students the option of selecting an area of chemical emphasis such as biological, pharmaceutical, polymer, materials, chemical physics, or chemical education. Students learn not only the basic science of chemistry but also the practical aspects of the discipline and its numerous applications. The IIT Bachelor of Science in Chemistry 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. An integral part of this stage is a research project under the supervision of a member of the chemistry faculty, culminating in a senior thesis. Students may receive certification of their Bachelor of Science in Chemistry degree through the American Chemical Society (**www.acs.org**) by selection of appropriate chemistry electives.

Optional Degree Programs in Chemistry

Because of the diversity of interests of students in chemistry and the increasing interdisciplinary impact of chemistry in other areas, IIT offers optional degree programs in chemistry. Each degree program maintains the five basic core areas of chemistry while at the same time providing options to prepare students to enter an operationally well-recognized career path. Students can elect the traditional Bachelor of Science degree in chemistry where they choose their own technical electives or focus on one of the following six options:

- Bachelor of Science in Chemistry with emphasis in Biological Chemistry
- Bachelor of Science in Chemistry with emphasis in Pharmaceutical Chemistry
- Bachelor of Science in Chemistry with emphasis in Polymer Chemistry
- Bachelor of Science in Chemistry with emphasis in Materials Chemistry
- Bachelor of Science in Chemistry with emphasis in Chemical Physics
- Bachelor of Science in Chemistry with emphasis in Chemical Education

Bachelor of Science in Chemistry

Required Courses	Credit Hours
Chemistry Requirements CHEM 100, 124, 125, 237, 239, 240, 247, 321, 343, 344, 415, 416*, 434, 450*, 451, 485*, 487*	54
Technical Electives**	15
Biology Requirement BIOL 401	3
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Interprofessional Projects	6
Total Hours	**127**

* CHEM 416, 450, 485 and 487 are not required for students pursuing the Bachelor of Science in Chemistry with emphasis in Chemical Education.

** One of the technical electives must be BIOL 107 or BIOL 115. This course must be taken before the student enrolls in BIOL 401.

Chemistry Curriculum

Semester 1		Credits
CHEM 100	Introduction to the Profession	2
CHEM 124	Principles of Chemistry I	4
CS 105	Intro to Computer Programming I	2
MATH 151	Calculus I	5
Humanities 100-level Elective		3
Total Hours		**16**

Semester 2		Credits
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Humanities or Social Sciences Elective		3
Total Hours		**16**

Semester 3		Credits
CHEM 237	Organic Chemistry I	4
CHEM 247	Analytical Chemistry	3
MATH 251	Multivariate & Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**18**

Semester 4		Credits
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Lab	2
MATH 252	Introduction to Differential Equations	4
Technical Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 5		Credits
CHEM 343	Physical Chemistry I	3
CHEM 321	Instrumental Analysis	4
IPRO 497	Interprofessional Project I	3
Technical Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
CHEM 344	Physical Chemistry II	4
CHEM 434	Spectroscopic Methods	4
CHEM 450	Introduction to Research**	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**14**

Semester 7		Credits
CHEM 415	Inorganic Chemistry	3
BIOL 401	Introductory Biochemistry	3
CHEM 451	Modern Techniques in Chem Literature	3
Technical Elective*		3
Technical Elective*		3
Total Hours		**15**

Semester 8		Credits
CHEM 487	Senior Thesis in Chemistry**	4
IPRO 497	Interprofessional Project II	3
CHEM 485	Chemistry Colloquium**	1
CHEM 416	Inorganic Chemistry Laboratory**	3
Technical Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17**

Total Credit Hours **127**

* Requires approval by the advisor. One of the technical electives must be BIOL 107 or BIOL 115. This course must be taken before the student enrolls in BIOL 401.

** CHEM 416, 450, 485, and 487 are not required for students pursuing the Bachelor of Science in Chemistry with emphasis in Chemical Education.

Optional Chemistry Degree Program Course Requirements

Students choosing to pursue one of the Optional Degree Programs below must take the following prescribed courses as technical electives. Detailed sample curricula are available for each of the degree programs, see: **www.iit.edu/csl/che/programs/undergrad**.

Bachelor of Science in Chemistry with Emphasis in Biological Chemistry

Program Advisor: N. Menhart
Biological chemistry is the study of the structure, composition, and chemical reactions of substances found in living systems. This option provides the necessary link between chemistry and biology which allows students to learn both the theory and technical skills required to initiate and successfully complete scientific problems at the interface of these two disciplines. The biological chemistry option is particularly well suited for students interested in the molecular basis of medicine. The option provides all the necessary background material required for admission to any medical, osteopathic, or veterinary school in the country.

Students must take:

BIOL 210 Microbiology Lectures
BIOL 225 Microbiology Laboratory
BIOL 214 Genetics
BIOL 402 Metabolic Biochemistry
BIOL 445 Cell Biology
BIOL 446 Cell Biology Laboratory

Bachelor of Science in Chemistry with Emphasis in Pharmaceutical Chemistry*

Program Advisor: H. S. Chong
Pharmaceutical chemistry is an area of chemistry focused on the development of new drugs used to prevent, cure, or relieve symptoms of disease. Modern medical practice relies on an enormous armamentarium of drugs that block, counteract, or lessen the debilitating effects of disease. The pharmaceutical chemistry option emphasizes the synthesis and characterization of pharmaceuticals as well as the relationship between the structure of the drug to its biological activity.

Students must take:

CHEM 455 Advanced Organic Chemistry
CHEM 531 Tactics of Organic Synthesis
CHEM 539 Introduction to Pharmaceutical Chemistry
BIOL 402 Metabolic Biochemistry
CHEM 497 Special Problems

Bachelor of Science in Chemistry with Emphasis in Polymer Chemistry*

Program Advisor: B. Mandal
A polymer is a chain of small molecules linked together to form a larger single molecule. Chemists make polymers because of their unique properties which they impart to products such as paints and adhesives, drug delivery systems, and artificial skin. The polymer chemistry option emphasizes the techniques involved in the synthesis and characterization of polymeric materials.

Students must take:

CHEM 455 Advanced Organic Chemistry
CHEM 470 Introduction to Polymer Chemistry
CHEM 535 Advanced Polymer Chemistry
CHEM 537 Polymer Chemistry Laboratory
CHEM 542 Polymer Characterization and Analysis

* Student interested in pursuing the pharmaceutical chemistry or polymer chemistry degree option must submit a formal letter of intent to a program advisor by the end of their second year. To insure adequate performance in CHEM 455 and graduate level organic chemistry courses, students should have completed CHEM 237 and CHEM 239 with grades of B or better. Students must also take the American Chemical Society placement examination in organic chemistry after they complete CHEM 239. The results will be used for advising and tracking purposes.

Bachelor of Science in Chemistry with Emphasis in Materials Chemistry

Program Advisor: M.I. Khan
Materials chemistry is focused on the preparation and characterization of pure chemicals or chemical systems that have some unique function. This function can be dependent on the material's optical, electronic, magnetic, or catalytic properties. The materials chemistry option draws from all five of the basic areas of chemistry to lay the foundation for understanding the synthesis, structure, characterization, and applications of materials. A particularly strong emphasis at IIT is programmatic access to advanced X-crystallographic instrumentation to study the structure of inorganic-based materials in the solid state.

Students must take:

MS 201	Materials Sciences
MMAE 486	Principles of Ceramics
PHYS 437	Solid State Physics
CHEM 470	Introduction to Polymer Chemistry

Students also select one course from the following:

MMAE 465	Electrical, Magnetic and Optical Properties of Materials
PHYS 415	Solid State Electronics

Bachelor of Science in Chemistry with Emphasis in Chemical Physics

Program Advisors: R. Wang/P. Lykos
Chemical Physics is focused on the development of theoretical constructs and experimental methodologies to infer the properties of bulk matter from a molecular prospective. Chemical physicists seek to unravel varied mysteries such as how proteins fold, how nanostructures form and behave, and how small molecules interact with cell membranes. The chemical physics option provides a solid foundation in chemistry with extensive coursework in physics and mathematics allowing students to make connections using the language of mathematics and the laws of physics to solve chemical problems.

Students must take:

PHYS 308	Classical Mechanics I
PHYS 401	Statistical Physics
PHYS 405	Fundamentals of Quantum Theory I
PHYS 410	Molecular Biophysics
PHYS 440	Computational Physics

Students also select one course from the following:

PHYS 412	Modern Optics and Lasers
PHYS 413	Electromagnetism I
PHYS 437	Solid State Physics

Bachelor of Science in Chemistry with Emphasis in Chemical Education

Program Advisors: S. Bishnoi/N. Lederman
There is a national need for teachers with a rigorous training in chemistry. The chemical education option not only leads to the bachelor of science degree in chemistry but also enables a student to obtain a science teaching certificate through our Department of Mathematics and Science Education (see pages 234–125 and **www.iit.edu/csl/msed**).

Students must also take:

MSED 200	Analysis of Classrooms (Practicum and Seminar)
MSED 250	Middle and Secondary School Curriculum/Foundations
MSED 300	Instructional Methods/Strategies I
MSED 320	Inquiry and Problem Solving in Mathematics and Science
MSED 350	Informal Education Practicum and Seminar
MSED 400	Instructional Methods/Strategies II
MSED 450	Professional Internship

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 IIT'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.

Bachelor of Science in Molecular Biochemistry and Biophysics

Required Courses	Credit Hours
Biology Requirements BIOL 100, 107, 109, 115, 117, 210, 214, 225, 401, 402, 404, 430, 445, 446, 451, 495 (2)	40
Chemistry Requirements CHEM 124, 125, 237, 239, 247 (or PHYS 300), 343, 344 (or PHYS 348)	24/25
Physics Requirements PHYS 123, 221, 223, 410	15
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152, 251, 252 (or PHYS 240), 425	20/21
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Total Hours	**128-130**

Molecular Biochemistry and Biophysics Curriculum

Semester 1		Credits
BIOL 100	Introduction to the Profession	2
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
Humanities 100-level Elective		3
Total Hours		**16**

Semester 3		Credits
PHYS 123	General Physics I	4
CHEM 237	Organic Chemistry I	4
BIOL 214	Genetics	3
MATH 251	Multivariate & Vector Calculus	4
CS 105	Intro to Computer Programming I	2
Total Hours		**17**

Semester 4		Credits
PHYS 221	General Physics II	4
CHEM 239	Organic Chemistry II	3
BIOL 210	Microbiology	3
BIOL 225	Microbiology Laboratory	2
IPRO 497	Interprofessional Project I	3
Humanities or Social Sciences Elective		3
Total Hours		**18**

Semester 5		Credits
BIOL 445	Cell Biology	3
PHYS 223	General Physics III	4
CHEM 247	Analytical Chemistry	
OR		3
PHYS 300	Instrumentation Lab	
CHEM 343	Physical Chemistry I	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
BIOL 430	Animal Physiology	3
PHYS 240	Computational Science	
OR		3/4
MATH 252	Introduction to Differential Equations	
PHYS 348	Modern Physics	
OR		3/4
CHEM 344	Physical Chemistry II	
Humanities or Social Sciences Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15/17**

Semester 7		Credits
BIOL 451	Literature in Biology	2
BIOL 401	Introductory Biochemistry	3
PHYS 410	Molecular Biophysics	3
BIOL 446	Cell Biology Laboratory	3
BIOL 495	Biology Colloquium	1
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 8		Credits
BIOL 402	Metabolic Biochemistry	3
BIOL 404	Biochemistry Laboratory	3
BIOL 495	Biology Colloquium	1
MATH 425	Statistical Methods	3
IPRO 497	Interprofessional Project II	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **128-130**

Physics

The undergraduate physics program at IIT provides an excellent preparation for a number of professions including law (patent and intellectual property), health physics, business, and research. Graduates are prepared for immediate entry into positions in industrial and government research laboratories, and for graduate study in biophysics, solid-state physics, or high energy physics. Many undergraduates go on to obtain graduate degrees not only in physics, but in engineering disciplines, the health sciences, and computer science as well.

A student completing a BS program in Physics at IIT will:

- Develop exceptional problem-solving ability
- Gain experience with instrumentation and measurement processes
- Develop mathematics and computational skills
- Gain a wide knowledge of physics as it applies both to the everyday world and to understanding nature's secrets.

Bachelor of Science in Physics

Required Courses	Credit Hours
Physics Requirements PHYS 100, 123, 221, 223, 240, 300, 304, 308, 309, 348, 405, 406, 413, 414, 427, 428, 440, 485 (2)	55
Interprofessional Projects	6
Mathematics Requirements MATH 151, 152, 251, 252	18
Mathematics Electives	6
Chemistry Requirements CHEM 124, 125	8
Computer Science Requirement CS 105	2
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Free Electives	12
Total Hours	**128**

Physics Curriculum

Semester 1		Credits
PHYS 123	General Physics I	4
CHEM 124	Principles of Chemistry I	4
PHYS 100	Introduction to the Profession	2
MATH 151	Calculus I	5
Humanities 100-level Elective		3
Total Hours		**18**

Semester 2		Credits
PHYS 221	General Physics II	4
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
Humanities or Social Science Elective		3
Total Hours		**16**

Semester 3		Credits
PHYS 223	General Physics III	4
CS 105	Intro to Computer Programming I	2
MATH 251	Multivariate & Vector Calculus	4
Humanities or Social Science Elective		3
Humanities or Social Science Elective (300+)		3
Total Hours		**16**

Semester 4		Credits
PHYS 348	Modern Physics	3
PHYS 240	Computational Science	3
MATH 252	Introduction to Differential Equations	4
Humanities or Social Science Elective (300+)		3
Humanities or Social Science Elective (300+)		3
Total Hours		**16**

Semester 5		Credits
PHYS 308	Classic Mechanics I	3
PHYS 300	Instrumentation Lab	3
IPRO 497	Interprofessional Project I	3
Mathematics Elective		3
Humanities or Social Science Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
PHYS 309	Classic Mechanics II	3
PHYS 304	Kinetic Theory and Thermodynamics	3
Free Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
PHYS 405	Quantum Theory I	3
PHYS 427	Advanced Physics Laboratory I	3
PHYS 413	Electricity and Magnetism I	3
PHYS 485	Physics Colloquium	1
IPRO 497	Interprofessional Project II	3
Free Elective		3
Total Hours		**16**

Semester 8		Credits
PHYS 406	Quantum Theory II	3
PHYS 428	Advanced Physics Laboratory II*	3
PHYS 440	Computational Physics	3
PHYS 414	Electricity and Magnetism II	3
PHYS 485	Physics Colloquium	1
Mathematics Elective		3
Total Hours		**16**

Total Credit Hours **128**

* PHYS 428 may be substituted by a semester of research with permission of the department.

Post-Baccalaureate Premedical Program

The purpose of the Post-Baccalaureate Premedical Program is to meet the needs of college graduates who have decided to pursue a medical education but who have taken none or only some 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 which are required for admission to any medical, osteopathic, or veterinary school in the country. Students who satisfactorily complete the program will be awarded a Certificate in Premedical Sciences.

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 the arts and sciences:

- One Year of College English, including a significant amount of expository writing
- One Year of College Mathematics, beyond precalculus, including at least one term of calculus. Statistics is recommended as the second mathematics course
- 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

Advising and Support

On the main campus of Illinois Institute of Technology there are a number of advisors who constitute the Premedical Advisory Committee, see: **www.iit.edu/~premed**. Post-Baccalaureate premedical students will be assigned an advisor 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 Post-Baccalaureate Premedical 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 IIT Honors Medical Society 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. The Princeton Review offers MCAT preparatory courses at reduced cost to IIT students in the Spring semester each year. Post-Baccalaureate Premedical Students are invited and encouraged to attend weekly colloquia in the biological, chemical, and physical sciences and in other departments offering seminars of medical interest. Finally, IIT's location in the city of Chicago is a special advantage to students in the Post-Baccalaureate Premedical 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 IIT post-baccalaureate premedical 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, IIT post-baccalaureate premedical students will be held to high academic standards. At a minimum, students must maintain a cumulative grade point average of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant's character. Students in the IIT Post-Baccalaureate Premedical Program are expected to conduct themselves with honesty and integrity inspiring confidence in their abilities to assume the responsibilities of medical practice.

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 grade point average 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 undergraduate admissions office for full consideration.

Certificate in Premedical Sciences*

Required Courses	Credit Hours
Chemistry Requirements CHEM 124, 125, 237, 239, 240	17
Biology Requirements BIOL 107, 109, 115, 117	8
Mathematics Requirements MATH 151, PSYC 203 or MATH 425	8
Physics Requirements PHYS 123, 221	8
Total Hours	**41**

* Students who complete all of these courses (or their equivalents) with a GPA of 3.000 will be awarded a Certificate in Premedical Sciences. A minimum of 15 credit hours must be completed at IIT to be awarded the Certificate in Premedical Sciences.

Premedical Sciences Curriculum

Semester 1		Credits
CHEM 124	Principles of Chemistry I	4
PHYS 123	General Physics I	4
MATH 151	Calculus I	5
Clinical Volunteer Service		0
Total Hours		**13**

Semester 2		Credits
CHEM 125	Principles of Chemistry II	4
PHYS 221	General Physics II	4
PSYC 203	Undergrad Stats for Behavioral Sciences	
OR		3
MATH 425	Statistical Methods	
Clinical Volunteer Service		0
Total Hours		**11**

Semester 3		Credits
CHEM 237	Organic Chemistry I	4
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	1
Research Volunteer Service		0
Total Hours		**8**

Semester 4		Credits
CHEM 239	Organic Chemistry II	3
CHEM 240	Organic Chemistry Laboratory	2
BIOL 115	Human Biology	3
BIOL 117	Human Biology Laboratory	1
Research Volunteer Service		0
Total Hours		**9**

Total Credit Hours **41**

Prepare and take MCAT in April.

Summer Session: Submit Medical School Applications

Semesters 5 & 6 – The Glide Year –
The following courses are recommended but not required:

BIOL 214 Genetics
BIOL 320 Biological Literature
BIOL 401 Introductory Biochemistry
BIOL 402 Metabolic Biochemistry
BIOL 430 Animal Physiology
BIOL 445 Cell Biology

Full-time employment in health care or in medical research is strongly encouraged during this year.

Other Degree Programs in Biological, Chemical and Physical Sciences

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 page 165.

Honors Law Program

Students in any of the BCPS programs are eligible for this program (see page 164). For students in biology, chemistry, or physics, this is a seven-year program which can be accelerated under special conditions approved by the student's advisor.

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 3.0 and obtains a satisfactory score on the GMAT. Students enrolled in any of the BCPS programs are eligible for this program.

Biomedical Engineering

Department Web site: www.iit.edu/engineering/bme

Mission

The mission of the biomedical engineering undergraduate program at IIT 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 IIT

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 health-care 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 B.S. in Biomedical Engineering.

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

- An ability to apply knowledge of mathematics, science, and engineering to the solution of biomedical engineering problems.
- An ability to design and conduct experiments as well as to analyze and interpret data.
- An ability to design a biomedical engineering 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 based upon analytical and critical thinking skills.
- 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 relevant to biomedical engineering.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- An understanding of biology and physiology, and the capability to apply advanced mathematics, science, and engineering to solve the problems at the interface of engineering and biology.
- The ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and nonliving materials and systems.

Our educational objectives describe the qualities and performance of our alumni:

- Our alumni apply quantitative, analytic, and critical thinking skills to solve biomedical engineering problems in industry, graduate or professional graduate programs.
- Our alumni employ biomedical engineering laboratory skills in industry, graduate or professional graduate programs.
- Our alumni employ written and oral communication skills in interaction with health care professionals, engineers or scientists in industry, graduate or professional graduate programs.
- Our alumni work in teams in industry, graduate or professional graduate programs.
- Our alumni exhibit the responsibility and ethics of a professional engineer in industry, graduate or professional graduate programs.

Faculty

Interim Chair
David J. Mogul
Room 314 Wishnick Hall
312.567.5324

Professors
DePaola, Turitto

Associate Professors
Anastasio, Arfanakis, Brey, Kamper, Kang-Mieler, Mogul, Troyk

Assistant Professor
Papavasiliou

Senior Lecturer
Gatchell

Faculty Emeritus
Arzbaecher

Areas of Specialization (Tracks)

The biomedical 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, see page 166 or go to **www.iit.edu/∼premed**.

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. Placing 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. Biomaterials 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 biomaterials are being developed which incorporate proteins or living cells in order to provide a truer biological and mechanical match for living tissue.

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

Required Courses	Credit Hours
Biomedical Engineering Core Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 490	21
Cell and Tissue Engineering Requirements CS 115, MMAE 200, MS 201, ECE 215, CHEM 237, 239, CHE 202, ENVE 426, BME 301, 335, 418, 482, two BME Electives (6 credit hours)	42
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 124, 125	8
Biology Requirements BIOL 115, 117, 430	7
Interprofessional Projects	6
Humanities and Social Science Requirements For general education requirements, see page 25.	21
Total Hours	**131**

Biomedical Engineering Curriculum: Cell and Tissue Track

Semester 1		Credits
BME 100	Introduction to the Profession	3
CS 115	Object-Oriented Programming I	2
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities 100-level Elective		3
Total Hours		**17**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Experimental Biology	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Total Hours		**17**

Semester 3		Credits
ECE 215	Circuit Analysis I	3
MATH 252	Introduction to Differential Equations	4
MMAE 200	Introduction to Mechanics	3
Humanities or Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
BME 200	BME Applications of MATLAB	1
MATH 251	Multivariate & Vector Calculus	4
MS 201	Materials Science	3
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 5		Credits
BME 315	Instrumentation Laboratory	2
BME 330	Analysis of Biosignals and Systems	3
CHE 202	Material and Energy Balances	3
CHEM 237	Organic Chemistry I	4
ENVE 426	Statistical Tools for Engineers	3
IPRO 497	Interprofessional Project I	3
Total Hours		**18**

Semester 6		Credits
BME 301	Biofluid Mechanics	3
BME 310	Biomaterials	3
BME 320	Biofluids Laboratory	1
BME 335	Thermodynamics of Living Systems	3
CHEM 239	Organic Chemistry II	3
BME Elective*		3
Total Hours		**16**

Semester 7		Credits
BIOL 430	Animal Physiology	3
BME 405	Physiology Laboratory	2
BME 418	Reaction Kinetics	3
BME 419	Introduction to Design	2
BME 482	Mass Transport for BME	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 8		Credits
BME 420	Design Concepts in BME	3
BME 490	Senior Seminar	1
IPRO 497	Interprofessional Project II	3
BME Elective*		3
Humanities or Social Sciences Elective (300+)		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **131**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

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.

Bachelor of Science in Biomedical Engineering: Medical Imaging Track

Required Courses	Credit Hours
Biomedical Engineering Core Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 490	21
Medical Imaging Requirements CS 115, 116, ECE 215, 216, 437, 481, BME 309, 438, 443, 445, PHYS 224 or CHEM 237, ENVE 426, MATH 333 or CHEM 239, two BME Electives (6 credit hours)	43/44
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 124, 125	8
Biology Requirements BIOL 115, 117, 430	7
Interprofessional Projects	6
Humanities and Social Science Requirements For general education requirements, see page 25.	21
Total Hours	**132/133**

Biomedical Engineering Curriculum: Medical Imaging Track

Semester 1		Credits
BME 100	Introduction to the Profession	3
CS 115	Object-Oriented Programming I	2
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities 100-level Elective		3
Total Hours		**17**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Experimental Biology	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Total Hours		**17**

Semester 3		Credits
CS 116	Object-Oriented Programming II	2
ECE 215	Circuit Analysis I	3
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
BME 200	BME Applications of MATLAB	1
ECE 216	Circuit Analysis II	3
MATH 251	Multivariate & Vector Calculus	4
PHYS 224	Thermal and Modern Physics	
OR		3/4
CHEM 237	Organic Chemistry I	
Humanities or Social Sciences Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17/18**

Semester 5		Credits
BME 309	Biomedical Imaging and Sensing	3
BME 315	Instrumentation Laboratory	2
BME 330	Analysis of Biosignals and Systems	3
ENVE 426	Statistical Tools for Engineers	3
MATH 333	Matrix Algebra and Complex Variables	
OR		3
CHEM 239	Organic Chemistry II	
IPRO 497	Interprofessional Project I	3
Total Hours		**17**

Semester 6		Credits
BME 310	Biomaterials	3
BME 320	Fluids Laboratory	1
BME 443	Biomedical Instrumentation/Electronics	3
BME 445	Quantitative Neural Function	3
BME Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 7		Credits
BIOL 430	Animal Physiology	3
BME 405	Physiology Laboratory	2
BME 419	Introduction to Design	2
ECE 437	Digital Signal Processing	3
IPRO 497	Interprofessional Project II	3
BME Elective*		3
Total Hours		**16**

Semester 8		Credits
BME 438	NeuroImaging	3
BME 420	Design Concepts in BME	3
BME 490	Senior Seminar	1
ECE 481	Image Processing	3
Humanities or Social Sciences Elective (300+)		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **132-133**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

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.

Bachelor of Science in Biomedical Engineering: Neural Engineering Track

Required Courses	Credit Hours
Biomedical Engineering Core Requirements BME 100, 200, 310, 315, 320, 330, 405, 419, 420, 490	21
Neural Engineering Requirements CS 115, ECE 211, 213, 218, BME 309, 443, 445, 438, ENVE 426, MATH 333 or CHEM 237, Technical Elective or CHEM 239, three BME Electives (9 credit hours)	43/44
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 124, 125	8
Biology Requirements BIOL 115, 117, 430	7
Interprofessional Projects	6
Humanities and Social Science Requirements For general education requirements, see page 25.	21
Total Hours	**132/133**

Biomedical Engineering Curriculum: Neural Engineering Track

Semester 1		Credits
BME 100	Introduction to the Profession	3
CS 115	Object-Oriented Programming I	2
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 2		Credits
BIOL 115	Human Biology	3
BIOL 117	Experimental Biology	1
CHEM 125	Principles of Chemistry II	4
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Total Hours		**17**

Semester 3		Credits
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
MATH 252	Introduction to Differential Equations	4
Humanities or Social Sciences Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
BME 200	BME Applications of MatLab	1
ECE 213	Circuit Analysis II	4
MATH 251	Multivariate & Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 5		Credits
BME 309	Imaging and Sensing	3
BME 315	Instrumentation Laboratory	2
BME 330	Analysis of Biosignals and Systems	3
MATH 333	Matrix Algebra and Complex Variables	
OR		3/4
CHEM 237	Organic Chemistry I	
IPRO 497	Interprofessional Project I	3
ENVE 426	Statistical Tools for Engineers	3
Total Hours		**17/18**

Semester 6		Credits
BME 310	Biomaterials	3
BME 320	BioFluids Laboratory	1
BME 443	Biomedical Instrumentation/Electronics	3
BME 445	Quantitative Neural Function	3
BME Elective*		3
CHEM 239	Organic Chemistry II	
OR		3
Technical Elective		
Total Hours		**16**

Semester 7		Credits
BIOL 430	Animal Physiology	3
BME 405	Physiology Laboratory	2
BME 419	Introduction to Design	2
IPRO 497	Interprofessional Project II	3
BME Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 8		Credits
BME 420	Design Concepts in BME	3
BME 438	NeuroImaging	3
BME 490	Senior Seminar	1
BME Elective*		3
Humanities or Social Sciences Elective (300+)		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **132-133**

* BME elective must be a 300+ level engineering course in BME, ECE, CHE, MMAE, or CAE.

Stuart School of Business

Department Web site: www.stuart.iit.edu

Through its programs in leadership, interprofessional projects, entrepreneurship, and business, the undergraduate business program helps prepare a new generation of men and women qualified to lead the companies and organizations of tomorrow in the face of a rapidly evolving global economy and technology base. The School delivers an innovative educational experience that results in unique value propositions for our students, faculty, and partners.

The Stuart School of Business offers two undergraduate business degrees:

- **Bachelor of Science in Business Administration** – The BSBA offers concentrations in entrepreneurship, finance, human resources, international business, and marketing that enable students to earn a degree that matches their career goals and aspirations.
- **Bachelor of Science in Business Administration and Applied Science** – The BSBA and Applied Science program provides students with the opportunity to combine their business education with concentrations in applied mathematics, chemistry, construction management, information technology, life sciences, material sciences, or mechanical engineering.

These are distinctive programs designed to educate students to deal with the problems of an increasingly complex business environment where an understanding of emerging technology is central to the practice of business administration and preparation for the next economy.

The objectives of both of these programs are to provide future business 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

Faculty

Dean of the Stuart School of Business
Harvey Kahalas

Associate Dean
Thomas C. Anderson

Associate Dean
Siva K. Balasubramanian

Professors
Balasubramanian, Bilson, Erramilli, Geisler, Goldhar, Hassan (Dean Emeritus) , Kahalas, Ong, Tourk

Associate Professors
Bariff, Khalili, Liao

Assistant Professors
Ashton, Chakravarti, Durango-Cohen, Harris, Sabbaghi, J. Sun, Wagman, H. Wang, T. Wu, Zeng

Clinical Professor
Twombly

Clinical Associate Professors
T. Anderson, C. Hamilton

Visiting Assistant Professor
Calia

Industry Professor
Gorham

Industry Associate Professor
Nassos

Research Professor
Thomopoulos

Senior Lecturers
Bonaccorsi, Braband, Bredine, S. Mueller, Peters

Lecturer
Van Vliet

Instructors
Brest Van Kempen, Chaudoin, Phillips

Faculty Emeriti
Calero, Chung, Knowles, Smith

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 business specialization that allows them to develop a depth of knowledge in a business area. Currently, available specializations are in Entrepreneurship, Finance, Marketing, International Business, and Human Resource Management. Individualized specializations can be developed to meet the special needs of a student.

Bachelor of Science in Business Administration

Required Courses	Credit Hours
Business Requirements BUS 100, 211, 212, 221, 301, 305, 311, 321, 341, 351, 361, 371, 402, 423, 480, ECON 151 and 152	49
Business Electives At least 12 hours in a designated business specialization. Courses are selected individually with the student's advisor. Specializations include: Entrepreneurship, Finance, Marketing, Human Resource Management, and International Business. The International Business specialization requires a semester abroad.	18
Mathematics Requirements MATH 120, 121	6
Science Requirements	13
Humanities and Social Science Requirements For general education requirements, see page 25.	21
Computer Science Requirement CS 105	2
Interprofessional Projects One of which must be an entrepreneurial IPRO.	6
Free Electives	5
Technical Electives	6
Total Hours	**126**

Business Administration Curriculum

Semester 1		Credits
BUS 100	Introduction to the Profession	3
ECON 151	Economics of the Firm	3
MATH 120	Business Mathematics I	3
CS 105	Intro to Computer Programming I	2
Science Elective		4
Total Hours		**15**

Semester 2		Credits
BUS 221	Stats for Managerial Decision Making	3
ECON 152	National and Global Economics	3
MATH 121	Business Mathematics II	3
Science Elective		3
Humanities 100-level Elective		3
Social Sciences Elective		3
Total Hours		**18**

Semester 3		Credits
BUS 211	Financial Accounting	3
BUS 301	Theory of Organization/Management	3
Science Elective		3
Science Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 4		Credits
BUS 212	Managerial Accounting	3
BUS 305	Operations Management	3
BUS 341	Business Law	3
BUS 351	Financial Management	3
Humanities Elective (300+)		3
Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 5		Credits
BUS 311	Strategic Cost Management	3
BUS 321	Management Science	3
BUS 361	Introduction to Entrepreneurship	3
BUS 371	Introduction to Marketing	3
Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 6	Credits
IPRO/EnPRO	3
Business Elective*	3
Business Elective*	3
Humanities Elective (300+)	3
Free Elective	3
Total Hours	**15**

Semester 7		Credits
BUS 423	Management Information Systems	3
IPRO/EnPRO		3
Business Elective*		3
Business Elective*		3
Technical Elective		3
Total Hours		**15**

Semester 8		Credits
BUS 402	Leadership Seminar	1
BUS 480	Business Strategy	3
Business Elective*		3
Business Elective*		3
Technical Elective		3
Free Elective		2
Total Hours		**15**

Total Credit Hours **126**

* At least 12 semester hours in a designated specialization.

Bachelor of Science in Business Administration and Applied Science

The Bachelor of Science in Business Administration and Applied Science provides a solid foundation in business fundamentals along with an excellent technology foundation which includes a minimum of 51 hours of mathematics, science, and engineering courses. Core business competencies include accounting, economics, statistics, finance, business law, marketing, management, entrepreneurship, and leadership. The technology curricula includes core mathematics and sciences and a specialization in a technology discipline that will help prepare students to work in a technology based industry. Specializations include life sciences, chemistry, physics, information technology, construction management, material science, mechanical engineering, and environmental management.

Bachelor of Science in Business Administration and Applied Science

Required Courses	Credit Hours
Business Requirements BUS 100, 211, 212, 221, 301, 305, 311, 321, 341, 351, 361, 371, 402, 423, 480, ECON 151 and 152	49
Business Electives	5
Mathematics Requirements MATH 151, 152	10
Science Requirements CHEM 124, PHYS 123, 221, BIOL 107	15
Humanities and Social Science Requirements For general education requirements, see page 25.	21
Computer Science Requirement CS 115	2
Interprofessional Projects One of which must be an entrepreneurial IPRO.	6
Technical Specialization Technical courses chosen individually with the student's advisor to provide a specialization in a specific technology or technologies related to a specific industry. Specializations include: Chemistry, Physics, Life Sciences, Information Technology, Environmental Management, Construction Management, Material Science, and Mechanical Engineering.	23
Total Hours	**131**

Business Administration and Applied Science Curriculum

Semester 1		Credits
BUS 100	Introduction to the Profession	3
ECON 151	Economics of the Firm	3
MATH 151	Calculus I	5
CS 115	Object-Oriented Programming I	2
CHEM 124	Principles of Chemistry I	4
Total Hours		**17**

Semester 2		Credits
BUS 221	Stats for Managerial Decision Making	3
ECON 152	National and Global Economics	3
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Humanities 100-level Elective		3
Total Hours		**18**

Semester 3		Credits
BUS 211	Financial Accounting	3
BUS 301	Theory of Organization/Management	3
BIOL 107	General Biology	3
PHYS 221	General Physics II	4
Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
BUS 212	Managerial Accounting	3
BUS 305	Operations Management	3
BUS 341	Business Law	3
BUS 351	Financial Management	3
Humanities Elective (300+)		3
Technical Elective		3
Total Hours		**18**

Semester 5		Credits
BUS 311	Strategic Cost Management	3
BUS 321	Management Science	3
BUS 361	Introduction to Entrepreneurship	3
BUS 371	Introduction to Marketing	3
Technical Elective		3
Total Hours		**15**

Semester 6	Credits
IPRO/EnPRO	3
Business Elective	2
Technical Elective	3
Technical Elective	3
Humanities Elective (300+)	3
Social Sciences Elective (300+)	3
Total Hours	**17**

Semester 7		Credits
BUS 423	Management Information Systems	3
IPRO/EnPRO		3
Business Elective		3
Technical Elective		3
Technical Elective		3
Total Hours		**15**

Semester 8		Credits
BUS 402	Leadership Seminar	1
BUS 480	Business Strategy	3
Technical Elective		2
Technical Elective		3
Humanities or Social Sciences Elective		3
Social Sciences Elective (300+)		3
Total Hours		**15**

Total Credit Hours **131**

Specializations in Business Administration and Applied Science

Specializations in Business Administration and Applied Science consist of technical courses chosen individually with the student's advisor to provide a focus in a technology or technologies related to a specific industry. Specializations include: Chemistry, Physics, Life Sciences, Information Technology, Environmental Management, Construction Management, Material Science, and Mechanical Engineering.

The following is the physics specialization for students in the Business Administration and Applied Science program. Students must take a minimum of 23 credits in the specialization. The following courses are recommended:

MATH 251	Multivariate & Vector Calculus
MATH 252	Introduction to Differential Equations
PHYS 223	General Physics III
PHYS 348	Modern Physics for Scientists and Engineers
PHYS 300	Instrumentation Laboratory
OR	
PHYS 427	Advanced Physics Laboratory I
PHYS 308	Classical Mechanics I
PHYS 405	Fundamentals of Quantum Theory I
PHYS 413	Electromagnetism I

Chemical and Biological Engineering

Department Web site: www.iit.edu/engineering/chbe

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 career 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.

A B.S. degree is offered in chemical engineering. 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 food processing engineering, chemical engineering/computer science, and gas engineering. The department also offers a B.S./M.D. program in engineering and medicine (see page 165) and a combined undergraduate/graduate law program (see page 164).

Faculty

Interim Chair
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312.567.3040

Professors
J. Anderson (IIT President), Arastoopour (Henry R. Linden Professor of Energy and Director of WISER), Cinar (Dean of the Graduate College, Vice Provost for Research, Director of Complex Systems and Dynamics Research Center, and Director of Engineering Center for Diabetics Research and Education), Myerson (Phillip Danforth Armour Professor of Engineering), Parulekar, Prakash (Director of Center of Excellence for Electrochemical Science and Engineering), Schieber, Teymour (S.C. Johnson Polymer Professor), Venerus (Hyosung S.R. Cho Professor of Chemical and Biological Engineering and Director of Center of Excellence in Polymer Science and Engineering), Wasan (Motorola Professor and Vice President for International Affairs)

Associate Professors
Abbasian, Chmielewski, Pérez-Luna, Ramani

Assistant Professor
Karuri

Senior Lecturer
Aderangi (Director of Undergraduate Laboratories)

Research Faculty
Nikolov, Plomp, Sun

Teaching Professors
Duvall, Greenberg, Tatara

Adjunct Professor
R. Anderson

Faculty Emeriti
Bernstein, Gidaspow, Selman

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 and Process Design IPRO) 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.

The Interprofessional Project Experience

Students in the chemical engineering program must be enrolled in six credits of Interprofessional Projects according to the following format:

- CHE/IPRO 296 Introduction to IPROs (1 credit)
- IPRO 497 Interprofessional Project (3 credits)
- CHE/IPRO 496 Design IPRO (2 credits)

IPRO 497 provides the opportunity to enroll in an IPRO offered by any academic unit. CHE/IPRO 296 and CHE/IPRO 496 create a package to accomplish interdisciplinary teamwork for process design.

CHE/IPRO 496 students attend one lecture weekly on process design and a weekly two-hour meeting with the expanded IPRO group and their project advisor. The expanded IPRO group consists of the CHE/IPRO 496 students, CHE/IPRO 296 students and students from other academic units who have registered for the relevant IPRO 497 sections (3 credit hours). CHE/IPRO 296 students provide support to the specific design activity through literature survey, data generation and use of design software as appropriate. CHE/IPRO 496 students are responsible for developing and designing the process. IPRO 497 students enrich the project by extending the work into their areas of specialization.

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 sophomore 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:

- Energy/Environment/Economics (E^3)
- Environmental Engineering
- Polymer Science and Engineering
- Bioengineering
- Process Design and Operation

Students may also choose a minor program (see pages 158–162). All students must include in their minor program, or as a technical elective, CHE 426 (Statistical Tools for Engineers) or at least one three-credit-hour engineering science course. Students who plan to go to graduate school are advised to take CHE 535 (Applications of Mathematics to Chemical Engineering) as a technical elective.

Bachelor of Science in Chemical Engineering

Required Courses	Credit Hours
Chemical Engineering Requirements CHE 100, 101, 202, 301, 302, 311, 317, 351, 406, 418, 423, 433, 435, 439, 451, 494	43
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirements CHEM 125, 237, 239, 343, 344	18
Computer Science Requirement CS 105	2
Electrical and Computer Engineering Requirement ECE 215 or 218	3
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Technical Electives	12
Interprofessional Projects CHE/IPRO 296, CHE/IPRO 496, IPRO 497	6
Total Hours	**131**

Chemical Engineering Curriculum

Semester 1		Credits
CHE 100	Introduction to the Profession I	2
MATH 151	Calculus I	5
CHEM 125	Principles of Chemistry II*	4
CS 105	Intro to Computer Programming I	2
Humanities 100-level Elective		3
Total Hours		**16**

Semester 2		Credits
CHE 101	Introduction to the Profession II	2
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Social Sciences Elective		3
Total Hours		**14**

Semester 3		Credits
CHE 202	Material and Energy Balances	3
MATH 252	Introduction to Differential Equations	4
CHEM 237	Organic Chemistry I	4
PHYS 221	General Physics II	4
Humanities Elective (300+)		3
Total Hours		**18**

Semester 4		Credits
CHE 296	Introduction to IPRO**	1
CHE 301	Fluid Mechanics	3
MATH 251	Multivariate & Vector Calculus	4
CHEM 239	Organic Chemistry II	3
CHEM 343	Physical Chemistry II	3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 5		Credits
CHE 302	Heat and Mass Transfer Operations	3
CHE 311	Foundations of Bio Science for Engineers	3
CHE 351	Thermodynamics I	3
ECE 215	Circuit Analysis I	
OR		3
ECE 218	Digital Systems	
Humanities Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
CHE 317	Chemical/Biological Engineering Lab I	2
CHE 451	Thermodynamics II	2
CHE 433	Process Modeling and System Theory	3
CHEM 344	Physical Chemistry II	4
IPRO 497	Interprofessional Project I	3
Technical Elective		3
Total Hours		**17**

Semester 7		Credits
CHE 418	Chemical/Biological Engineering Lab II	2
CHE 423	Chemical Reaction Engineering	3
CHE 435	Process Control	3
CHE 494	Process Design	3
Technical Elective		3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 8		Credits
CHE 406	Transport Phenomena	3
CHE 439	Numerical and Data Analysis	3
IPRO 496	Design IPRO**	2
Technical Elective		3
Technical Elective		3
Humanities or Social Sciences Elective		3
Total Hours		**17**

Total Credit Hours **131**

* Initial placement in CHEM 125 requires consent of the BCPS department.

** Satisfies part of the General Education Requirement for Interprofessional Projects. Only CHE majors may register for CHE/IPRO 296 and CHE/IPRO 496.

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 four courses in the specialization area.

Energy/Environment/Economics (E^3)
Program advisor: J. Abbasian

Students must take the following course:

CHE 543 Energy, Environment, Economics

In addition, they should choose at least one course from each of these two areas:

Energy Sources, Conversion, Utilization, and Distribution

CHE 465	Electrochemical Energy Conversion
CHE 467	Fuel Cell System Design
CHE 489	Fluidization
CHE 491	Undergraduate Research
CHE 517	Gas Utilization Technologies and Economics
CHE 522	Fundamentals of Combustion
CHE 541	Renewable Energy Technologies
CHE 565	Electrochemical Engineering
CHE 567	Fuel Cell Fundamentals
CHE 582	Interfacial and Colloidal Phenomena
ECE 319	Fundamentals of Power Engineering
ECE 411	Power Electronics
ECE 419	Power System Analysis
ECE 420	Analysis Methods in Power Systems
ECE 438	Control Systems
MMAE 423	Air Conditioning and Refrigeration
MMAE 424	Internal Combustion Engines
MMAE 425	Direct Energy Conversion
MMAE 426	Nuclear, Fossil-Fuel, & Sustainable Energy Systems
MMAE 524	Fundamentals of Combustion
MMAE 525	Fundamentals of Heat Transfer

Energy and Environment, System Analysis, and Special Problems

CHE 426	Statistical Tools for Engineers
ENVE 404	Water and Wastewater Engineering
ENVE 463	Introduction to Air Pollution Control
ENVE 485	Pollution Prevention
ECE 491	Undergraduate Research
MMAE 491	Undergraduate Research
MMAE 494	Undergraduate Design Project
MMAE 497	Undergraduate Special Topic
ECON 423	Economic Analysis of Capital Investments
PS 338	Energy and Environmental Policy
IPRO 497	In Energy/Environment Areas

Appropriate substitution may be made with the approval of the program advisor.

Environmental Engineering
Program advisor: D. Moschandreas

Students must take two courses from each of the following two areas:

Environmental Engineering

CHE 426	Statistical Tools for Engineers
ENVE 404	Water and Wastewater Engineering
ENVE 463	Introduction to Air Pollution Control
ENVE 485	Pollution Prevention
ENVE 491	Undergraduate Research

Civil Engineering

CAE 421	Risk Assessment Engineering
CAE 482	Hydraulic Design of Open Channel Systems
CAE 483	Environmental Systems for Building I
CAE 484	Environmental Systems for Building II
IPRO 497	In Energy/Environment Areas

Appropriate substitution may be made with the approval of the program advisor.

Process Design and Operation
Program advisor: D. Chmielewski

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

Two courses must be taken from the following:

CHE 426	Statistical Tools for Engineers
CHE 508	Process-Design Optimization
CHE 530	Advanced Process Control
CHE 560	Statistical Quality and Process Control

Two courses must be selected from the following (only one may be an ENVE course):

CHE 430	Petrochemical Process Operations and Design
CHE 465	Electrochemical Energy Conversion
CHE 475	Food Engineering I
CHE 476	Food Engineering II
CHE 489	Fluidization
CHE 491	Undergraduate Research
CHE 571	Food Process Engineering
CHE 572	Advanced Food Process Engineering
ENVE 463	Introduction to Air Pollution Control
ENVE 476	Engineering Control of Industrial Hazards
ENVE 485	Pollution Prevention
ENVE 578	Industrial Gas Cleaning
ENVE 580	Hazardous Waste Engineering
FPE 521	Food Process Engineering
FPE 522	Advanced Food Process Engineering

Polymer Science and Engineering
Program advisors: J. Schieber, D. Venerus

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

Students must take one of the following courses:

CHE 470	Introduction to Polymer Science
CHEM 470	Introduction to Polymer Science
MMAE 470	Introduction to Polymer Science

In addition, they should choose at least two courses from the following:

CHE 538	Polymerization Reaction Engineering
CHE 555	Polymer Processing
CHE 575	Polymer Rheology
CHEM 535	Advanced Polymer Chemistry
CHEM 537	Polymer Chemistry Laboratory
CHEM 542	Interfacial Characterization of Polymers
MMAE 579	Characterization of Polymers
MMAE 580	Structure and Property of Polymers
MMAE 581	Theory of Mechanical Behavior of Polymers

Students may take up to one course from the following:

CHE 426	Statistical Tools for Engineers
CHE 489	Fluidization
CHE 491	Undergraduate Research
CHE 582	Interfacial and Colloidal Phenomena
FPE 541	Principles of Food Packaging
MMAE 451	Finite Element Methods in Engineering
MMAE 485	Manufacturing Processing

Appropriate substitution may be made with the approval of the program advisor.

Bioengineering
Program advisors: S. Parulekar and V. Pérez-Luna

Bioengineering has two career specializations:

Biomedical Engineering

Students must take the following three courses:

BIOL 107	General Biology
BIOL 115	Human Biology
CHE 577	Bioprocess Engineering

One elective is chosen from the following:

BIOL 214 Genetics
OR
BIOL 414 Genetics for Engineering Scientists
BIOL 401 Introductory Biochemistry
BIOL 430 Animal Physiology
BIOL 445 Cell Biology
CHE 491 Undergraduate Research

Biotechnology

Students must take the following course:

CHE 577 Bioprocess Engineering

Three electives are chosen from the following:

BIOL 107 General Biology
BIOL 214 Genetics
OR
BIOL 414 Genetics for Engineering Scientists
BIOL 401 Introductory Biochemistry
BIOL 423 Microbial Genetics Laboratory
BIOL 445 Cell Biology
FPE 505 Food Microbiology

Civil, Architectural, and Environmental Engineering

Department Web site: www.iit.edu/engineering/cae

The objective of the civil engineering program is to educate graduates who are prepared to enter the civil engineering profession. Also, this program will prepare students to begin graduate studies in engineering or other disciplines. This 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 degree 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 subdivisions of civil engineering are structural engineering, transportation engineering, geotechnical engineering, environmental engineering, water resources engineering, and construction management.

The Department of Civil, Architectural, and Environmental Engineering provides introductory undergraduate education in these six subdisciplines of civil engineering and provides professional specializations in the areas of structural, geotechnical, transportation, civil-environmental, construction engineering, and architectural engineering. The department also offers graduate degree programs and conducts research in the areas of structural engineering, geotechnical engineering, transportation engineering, construction engineering and management, and environmental engineering.

Students may choose a professional specialization as described on the following pages, or one of the following minors: Air Force Aerospace Studies, Military Science, and Naval Science (see pages 158–162).

Architecture students who plan to pursue a master's degree in structural engineering should take the following courses:

CAE 303 Structural Design I
CAE 304 Structural Analysis I
CAE 307 Structural Design II
CAE 310 Structural Analysis II
CAE 431 Steel Design
CAE 432 Concrete and Foundation Design

Students should consult the ***IIT Bulletin: Graduate Programs*** for additional details.

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 in October and April. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Faculty

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Associate Chair
Environmental Engineering Programs
Demetrios Moschandreas
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Professors
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Associate Professors
P. Anderson, Budiman, Z. Li, O'Leary, Shen

Assistant Professor
Menches

Visiting Assistant Professor
Modares

Clinical Associate Professor
Muehleisen

Senior Lecturers
Novak, Snyder

Adjunct Professors
Carreira, Domel, Gill, Jahedi, Kurzydlo, Lemming, Longinow, Oskooie, Paintal, Rohter

Adjunct Associate Professor
Sriraj

Adjunct Assistant Professors
Grabowski, Speroni

Research Professor
Lue-Hing

Faculty Emeriti
Dygdon, Guralnick, Khisty

Bachelor of Science in Civil Engineering

Required Courses	Credit Hours
Civil Engineering Requirements CAE 100, 101, 105, 110, 111, 221, 301, 302, 303, 304, 307, 310, 312, 315, 323, 419, 431, 432, 457, 470	54
CAE Electives	6
Technical Electives*	9
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
IPRO Capstone Design Requirement	3
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Engineering Course Requirements MMAE 200, 202, 305	9
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Total Hours	**137**

* Of the total of three technical electives, one must be a junior-year IPRO.

Civil Engineering Curriculum

Semester 1		Credits
CAE 100	Intro to Engineering Drawing & Design	2
CAE 110	Professional Practice I	1
CAE 105	Geodetic Science	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities 100-level Elective		3
Total Hours		**18**

Semester 2		Credits
CAE 101	Intro to AutoCAD Drawing & Design	2
CAE 111	Professional Practice II	1
MATH 152	Calculus II	5
CS 105	Intro to Computer Programming I	2
PHYS 123	General Physics I	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 251	Multivariate & Vector Calculus	4
MMAE 200	Introduction to Mechanics	3
CAE 221	Engineering Geology	3
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
MATH 252	Introduction to Differential Equations	4
MMAE 305	Dynamics	3
MMAE 202	Mechanics of Solids II	3
PHYS 224	General Physics III	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 5		Credits
CAE 301	Hydraulics and Hydrology	3
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 312	Engineering Systems Analysis	3
CAE 315	Materials of Construction	3
CAE or Technical Elective*		3
Total Hours		**18**

Semester 6		Credits
CAE 302	Fluid Mechanics and Hydraulics	3
CAE 307	Structural Design II	3
CAE 310	Structural Analysis II	3
CAE 323	Intro to Geotechnical Engineering	3
CAE or Technical Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 7		Credits
CAE 419	Transport Engineering and Design	3
CAE 431	Steel Design	3
CAE 457	Geotechnical Foundation Design	3
CAE 470	Construction Methods/Cost Estimating	3
CAE or Technical Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 8		Credits
CAE 432	Concrete and Foundation Design	3
CAE or Technical Elective*		3
CAE or Technical Elective*		3
IPRO Capstone Design Course		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Total Credit Hours **137**

* At least two courses must be CAE 400-level courses and one of the remaining technical electives must be a junior year IPRO.

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

Professional Specializations in Civil Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the technical electives listed under the respective area of specialization below. Three additional credit hours may be any 400-level CAE course taken with prior approval of the student's advisor and chair.

Structural Engineering

CAE 408 Bridge and Structural Design
CAE 420 Dynamics of Structures
CAE 430 Probability Concepts in Civil Engineering
CAE 435 Experimental Analysis of Structures
CAE 442 Finite Elements Methods in Framed Structures

Construction Engineering and Management

CAE 471 Construction Planning and Scheduling
CAE 472 Construction Site Operation
CAE 473 Construction Project Administration

Geotechnical Engineering

CAE 415 Pavement Design, Construction, and Maintenance
CAE 442 Finite Element Methods in Framed Structures
CAE 486 Soil and Site Improvement

Transportation Engineering

CAE 415 Pavement Design, Construction, and Maintenance
CAE 416 Facility Design of Transportation Systems
CAE 417 Railroad Engineering Studies and Design
CAE 430 Probability Concepts in Civil Engineering

Civil-Environmental Engineering

The department offers a significant specialization in environmental engineering that involves technical electives and substitutions for required courses. Those interested should consult with the department.

Architectural Engineering

Department Web site: www.iit.edu/engineering/cae

The objective of the architectural engineering program is to educate graduates who are prepared to enter the architectural engineering profession. Also, this program will prepare students to begin graduate studies in engineering. This 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 which offers students an opportunity to obtain an engineering education specializing in building architecture, building-system integration, and 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 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's degree in architectural engineering should take the following courses:

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

Students should consult the ***IIT Bulletin: Graduate Programs*** for additional details.

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 in October and April. Students should contact the Department of Civil, Architectural, and Environmental Engineering for information concerning this examination.

Bachelor of Science in Architectural Engineering

Required Courses	Credit Hours
Architectural Engineering Requirements CAE 100, 101, 105, 110, 111, 208, 209, 303, 304, 307, 312, 315, 323, 331, 334, 383, 461, 464, 468, 469, 470, 471	59
IPRO Capstone Design Requirement	3
Technical Electives*	12
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Engineering Course Requirements MMAE 200, 202	6
Humanities Requirement AAH 119	3
Humanities and Social Sciences Requirements For general education requirements, see page 25.	18
Total Hours	**136**

* Of the total of four technical electives, one must be a junior-year IPRO.

Architectural Engineering Curriculum

Semester 1		Credits
CAE 100	Intro to Engineering Drawing & Design	2
CAE 110	Professional Practice I	1
CAE 105	Geodetic Science	3
CHEM 124	Principles of Chemistry I	4
MATH 151	Calculus I	5
Humanities 100-level Elective		3
Total Hours		**18**

Semester 2		Credits
CAE 101	Intro to AutoCAD Drawing & Design	2
CAE 111	Professional Practice II	1
CS 105	Intro to Computer Programming I	2
PHYS 123	General Physics I	4
MATH 152	Calculus II	5
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MMAE 200	Introduction to Mechanics	3
PHYS 221	General Physics II	4
MATH 251	Multivariate & Vector Calculus	4
CAE 208	Thermo-Fluids Engineering I	3
AAH 119	History of World Architecture I	3
Total Hours		**17**

Semester 4		Credits
MMAE 202	Mechanics of Solids II	3
PHYS 224	General Physics III	3
MATH 252	Introduction to Differential Equations	4
CAE 209	Thermo-Fluids Engineering II	4
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 5		Credits
CAE 315	Materials of Construction	3
CAE 312	Engineering Systems Analysis	3
CAE 303	Structural Design I	3
CAE 304	Structural Analysis I	3
CAE 331	Building Science	3
CAE 383	Electrical and Electronic Circuits	3
Total Hours		**18**

Semester 6		Credits
CAE 307	Structural Design II	3
CAE 323	Intro to Geotechnical Engineering	3
CAE 334	Illumination and Acoustics	3
CAE 461	Plumbing and Fire Protection Design	3
IPRO 497	(Not 315 or 335)	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 7		Credits
CAE 470	Construction Methods/Cost Estimating	3
CAE 468	Architectural Design	2
CAE 464	HVAC Systems Design	3
CAE Technical Elective		3
CAE Technical Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 8		Credits
CAE 471	Construction Planning and Scheduling	3
CAE 469	Architectural Studio	2
IPRO Capstone Design Course		3
CAE Technical Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**14**

Total Credit Hours **136**

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

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.

Building Mechanical and Energy

CAE 403 Sound and Vibration Control in Buildings
CAE 463 Building Enclosure Design
CAE 465 Building Energy Conservation Technologies

Acoustics and Illumination

CAE 403 Sound and Vibration Control in Building
CAE 409 Acoustic Performance Spaces
CAE 467 Lighting Systems Design

Structural Engineering*

CAE 310 Structural Analysis II
CAE 431 Steel Design
CAE 432 Concrete and Foundation Design

Construction and Engineering Management

CAE 421 Risk Assessment Engineering
CAE 472 Construction Site Operation
CAE 473 Construction Project Administration

Electrical and Illumination

CAE 465 Building Energy Conservation Technologies
CAE 466 Building Electrical Systems Design
CAE 467 Lighting Systems Design

Fire Protection and Life Safety

CAE 422 Sprinklers, Standpipes, and Fire Pumps
CAE 424 Introduction to Fire Dynamics
CAE 425 Fire Protection and Life Safety

* Students should take CAE 310 in Semester 6 and an IPRO in Semester 7.

Engineering Graphics-Optional Programs

Engineering graphics is an indispensable communication and design tool which is 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, 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.

For further information call 312.567.3365.

Certificate in Engineering Graphics and CAD Curriculum

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 an engineering graphics certificate program. 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.

Students must take:

EG 105 Engineering Graphics and Design*
EG 305 Advanced Engineering Graphics and Design
EG 306 Engineering Descriptive Geometry
EG 405 Mechanical Design Graphics
EG 406 Technical and Pictorial Illustration
EG 419 Computer Graphics in Engineering

*CAE 100 and CAE 101 may be substituted for EG 105.

Professional Specialization in Engineering Graphics

The department offers a comprehensive series of special courses in engineering graphics that a student may take as electives in areas related to individual professional goals. Consult the department for advice on appropriate courses.

Engineering Management

Department Web site: www.iit.edu/engineering/cae

The Engineering Management program at IIT 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.

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

Bachelor of Science in Engineering Management

Required Courses	Credit Hours
Mathematics/Computer Science Requirements MATH 151, 152, 251, 252, CS 105	20
Physics Requirements PHYS 123, 221	8
Chemistry Requirement	3-4
Introduction to the Profession	2
Core Engineering Specialization (Individual department requirements vary)	28-30
Core Entrepreneurship Requirements BUS 211, 212, 301, 305, 362, 363, 371, 466	24
Interprofessional Projects	6
Humanities and Social Science Requirements ECON 211 is recommended. For general education requirements, see page 25.	21
Core Engineering Technical Electives	9
Free Electives	6
Total Hours	**127-130**

Engineering Management Specializations

Specializations include those listed below. See **www.iit.edu/engineering/cae** for additional specializations.

Civil Engineering (28 Credit Hours)

Students must take:

CAE 100	Introduction to Engineering Drawing and Design
CAE 101	Introduction to AutoCAD Drawing and Design
MMAE 200	Introduction to Mechanics
MMAE 202	Mechanics of Solids II
MMAE 305	Dynamics
CAE 301	Hydraulics and Hydrology
CAE 302	Fluid Mechanics and Hydraulics
CAE 312	Engineering Systems Analysis
CAE 315	Materials of Construction

Students must also take one of the following courses:

CAE 303	Structural Design
CAE 323	Soil Mechanics

Architectural Engineering (29 Credit Hours)

Students must take:

CAE 100	Introduction to Engineering Drawing and Design
CAE 101	Introduction to AutoCAD Drawing and Design
MMAE 200	Introduction to Mechanics
MMAE 202	Mechanics of Solids II
CAE 208	Thermal-Fluid Engineering I
CAE 209	Thermal-Fluid Engineering II
CAE 312	Engineering Systems Analysis
CAE 331	Building Science
CAE 334	Illumination and Accoustics

Students must also take one of the following courses:

CAE 383	Electrical and Electronic Circuits
CAE 461	Plumbing and Fire Protection

Materials Science and Engineering (28 Credit Hours)

Students must take:

MMAE 100	Introduction to the Profession*
MS 201	Materials Science
MMAE 200	Introduction to Mechanics
MMAE 202	Mechanics of Solids II
MMAE 232	Design for Innovation
MMAE 365	Structure & Properties of Materials I
MMAE 370	Materials Laboratory I
MMAE 463	Structure & Properties of Materials II

Students must also take two of the following courses:

MMAE 371	Engineering Materials
OR	
MMAE 372	Design or Aerospace Materials Laboratory
MMAE 470	Introduction to Polymer Science
MMAE 468	Introduction to Ceramics
OR	
MMAE 472	Advanced Aerospace Materials
OR	
MMAE 482	Composites
MMAE 476	Materials Laboratory II
MMAE 485	Manufacturing Processes

Mechanical Engineering (29/30 Credit Hours)

Students must take:

MMAE 100	Introduction to the Profession*
MS 201	Materials Science
MMAE 200	Introduction to Mechanics
MMAE 202	Mechanics of Solids II
MMAE 232	Design for Innovation
MMAE 313	Fluid Mechanics
MMAE 315	Aerospace Laboratory I
OR	
MMAE 319	Mechanical Laboratory II
MMAE 320	Thermodynamics

Students must also take one of the following courses:

MMAE 302	Mechanics of Solids II
MMAE 321	Applied Thermodynamics
MMAE 322	Heat & Mass Transfer with Laboratory
OR	
MMAE 323	Heat & Mass Transfer
MMAE 332	Design of Machine Elements
MMAE 547	Computer-Integrated Manufacturing Technologies
MMAE 557	Computer-Integrated Manufacturing Systems
MMAE 589	Applications in Reliability Engineering I
MMAE 590	Applications in Reliability Engineering II

* Two hours of MMAE 100 applies to the Introduction to the Profession requirement and one hour applies to the specialization.

Computer Science

Department Web site: www.iit.edu/csl/cs

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 computers and computer 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 computer networks, to the design and implementation of sophisticated software systems.

The department offers two undergraduate programs in computer science: a Bachelor of Science in Computer Science and Bachelor of Science in Computer Information Systems. Both programs provide an excellent background in computer science 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.

In addition to these programs in computer science, the university offers a Bachelor of Science in Computer Engineering. This program focuses on both the digital electronics hardware used in computer systems and the software that controls this hardware, with an emphasis on the design and implementation of computer-controlled systems. This program is described in detail on page 101.

Each graduate of the B.S. in Computer Science program should be able to:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- An ability to function effectively on teams to accomplish a common goal
- An understanding of professional, ethical, legal, security, and social issues and responsibilities
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations, and society
- Recognition of the need for, and an ability to engage in, continuing professional development
- An ability to use current techniques, skills, and tools necessary for computing practices
- An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices
- An ability to apply design and development principles in the construction of software systems of varying complexity
- Be prepared to enter a top-ranked graduate program in Computer Science

All three 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 weekly labs in which students use state-of-the-art software development techniques (object-oriented programming in C++ or Java, for instance) to create solutions to interesting problems. The department's unique four-phase laboratory model encourages student creativity by providing ample opportunity for constructive feedback on each student's efforts. Having completed the introductory core, a student is prepared to work independently within a well-structured design framework-in the classroom or on the job.

The last two years of study build upon this foundation. The Bachelor of Science 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, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives including computer graphics, artificial intelligence, database systems, computer architecture, and computer networks, among others. As with the introductory sequence, these advanced courses stress "hands-on" learning by doing. A generous allotment of free electives allows students to combine study in computer science with study in another field-either by taking a well-defined specialized minor in another discipline or by working with an advisor to formulate a program that combines experiences across disciplines.

The B.S. in Computer Information Systems program emphasizes the use of computers as sophisticated problem-solving tools. 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).

Faculty

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Cynthia Hood
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Director of Undergraduate Programs
Matthew Bauer
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Professors
Carlson, Kapoor, Reingold, X. Sun, Wan

Associate Professors
Agam, Argamon, Calinescu, Grossman, Hood, Korel, Lan, X.Y. Li, Ren

Assistant Professors
Bilgic, Raicu

Research Faculty
Elrad, Roberson, Yee

Industry Professor
Leung

Industry Associate Professor
Chlebus

Senior Lecturers
M. Bauer, Beckman, Sasaki, Soneru

Full-Time Instructors
Bistriceanu, Hanrath, Koutsogiannakis, Saelee, Winans

Adjunct Faculty
Bader

Part-Time Instructors
Aldawud, Choi

Faculty Emeriti
C. Bauer, I. Burnstein, Evens, Greene

Bachelor of Science in Computer Science

Required Courses	Credit Hours
Computer Science Requirements CS 100, 115, 116*, 330**, 331, 350, 351, 430, 440, 450, 485, 487	33
Computer Science Electives* **	15
Mathematics Requirements MATH 151, 152, 251, (332 or 333), (474 or 475)	20
Mathematics Elective Chosen from MATH 252, 410, 435 453, 454, 476, 482	3
Science Requirements PHYS 123, 221	8
Science Electives******	6
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Writing and Speaking Elective COM 421 or COM 428	3
Interprofessional Projects	6
Free Electives	12
Total Hours	**127**

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

** MATH 230 is allowed as a substitute for CS 330.

*** 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, CS 402, CS 403, and CS 406. ECE 218 - Digital Systems and ECE 441 - Microcomputers may also be used as computer science electives. No courses from any other programs can be used as computer science electives.

**** Science electives (no lab required): Chosen from the natural sciences (Biology, Chemistry, and Physics), MS 201 - Materials Science, or Psychology (limited to courses marked with an N in the IIT Bulletin). At least one course must be in a field other than Physics.

The Bachelor of Science in Computer Science degree is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: 410.347.7700.

Computer Science Curriculum

Semester 1		Credits
CS 100	Introduction to the Profession	2
CS 115	Object-Oriented Programming I*	2
MATH 151	Calculus I	5
Humanities 100-level Elective		3
Social Sciences Elective		3
Total Hours		**15**

Semester 2		Credits
CS 116	Object-Oriented Programming II*	2
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
Humanities Elective (300+)		3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 3		Credits
CS 331	Data Structures and Algorithms	3
CS 330	Discrete Structures**	3
MATH 251	Multivariate & Vector Calculus	4
PHYS 221	General Physics II	4
Social Sciences Elective(300+)		3
Total Hours		**17**

Semester 4		Credits
CS 350	Computer Org/Assembly Language Prog	3
CS 430	Introduction to Algorithms	3
MATH 332	Matrices	
OR		3
MATH 333	Matrix Algebra and Complex Variables	
Humanities Elective (300+)		3
Science Elective****		3
Total Hours		**15**

Semester 5		Credits
CS 351	System Programming	3
CS 440	Programming Languages/Translators	3
MATH 474	Probability and Statistics	
OR		3
MATH 475	Probability	
COM 421	Technical Communication	
OR		3
COM 428	Verbal and Visual Communication	
Computer Science Elective***		3
Total Hours		**15**

Semester 6		Credits
CS 450	Operating Systems	3
IPRO 497	Interprofessional Project I	3
Computer Science Elective***		3
Mathematics Elective		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
CS 487	Software Engineering	3
IPRO 497	Interprofessional Project II	3
Computer Science Elective***		3
Science Elective****		3
Humanities or Social Sciences Elective		3
Free Elective		3
Total Hours		**18**

Semester 8		Credits
CS 485	Computers in Society	3
Computer Science Elective***		3
Computer Science Elective***		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours 127

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

** MATH 230 is allowed as a substitute for CS 330.

*** 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, CS 402, CS 403, and CS 406. ECE 218 - Digital Systems and ECE 441 - Microcomputers may also be used as computer science electives. No courses from any other programs can be used as computer science electives.

**** Science electives (no lab required): Chosen from the natural sciences (Biology, Chemistry, and Physics), MS 201 - Materials Science, or Psychology (limited to courses marked with an N in the IIT Bulletin). At least one course must be in a field other than Physics.

The Bachelor of Science in Computer Science degree is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: 410.347.7700.

Bachelor of Science in Computer Information Systems

Required Courses	Credit Hours
Computer Science Requirements CS 100, 115, 116, 330**, 331, 350, 351	18
Computer Science Technical Electives*	15
Computer Science Electives	6
Mathematics Requirement MATH 151	5
Mathematics Elective	3
Science Requirements BIOL 107 or 115, CHEM 124, PHYS 123	11
Science Elective	3
Humanities Requirement Humanities 100-level course	3
Humanities Electives	9
Psychology Requirements PSYC 221, 301	6
Social Sciences Requirement PS 200	3
Social Sciences Electives	6
Interprofessional Projects	6
Minor Electives	15
Free Electives	18
Total Hours	**127**

* Computer science technical electives are designated with a **(T)** in the course descriptions.

** MATH 230 is allowed as a substitute for CS 330.

Computer Information Systems Curriculum

Semester 1		Credits
CS 100	Introduction to the Profession	2
CS 115	Object-Oriented Programming I	2
MATH 151	Calculus I	5
PSYC 221	Human Behavior Growth and Learning	3
Humanities 100-level		3
Total Hours		**15**

Semester 2		Credits
CS 116	Object-Oriented Programming II	2
BIOL 115	Human Biology	
OR		3
BIOL 107	General Biology	
Mathematics Elective		3
Humanities Elective		3
Social Sciences Elective		3
Total Hours		**14**

Semester 3		Credits
CS 330	Discrete Structures**	3
CS 331	Data Structures and Algorithms	3
CHEM 124	Principles of Chemistry I	4
PS 200	American Government	3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 4		Credits
CS 350	Computer Org/Assembly Language Prog	3
PHYS 123	General Physics I	4
Minor Elective		3
Computer Science Elective		3
Computer Science Technical Elective*		3
Total Hours		**16**

Semester 5		Credits
CS 351	Systems Programming	3
Minor Elective		3
Science Elective		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 6		Credits
PSYC 301	Industrial Psychology	3
IPRO 497	Interprofessional Project I	3
Minor Elective		3
Computer Science Technical Elective*		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**18**

Semester 7	Credits
Minor Elective	3
Computer Science Elective	3
Computer Science Technical Elective*	3
Computer Science Technical Elective*	3
Social Sciences Elective (300+)	3
Free Elective	3
Total Hours	**18**

Semester 8		Credits
IPRO 497	Interprofessional Project II	3
Minor Elective		3
Computer Science Technical Elective*		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **127**

* Computer science technical electives are designated with a **(T)** in the course descriptions.

** MATH 230 is allowed as a substitute for CS 330.

Specializations in Computer Science

Students in either the CS or CIS program may elect to complete one or both 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 Educational Services. A minimum of 4 courses are required for a specialization.

Specialization in Information Security

CS 425 Database Organization
CS 458 Information Security
CS 455 Data Communications
CS 549 Cryptography and Network Security

Specialization in Information and Knowledge Management Systems

Students must take the following courses:

CS 425 Database Organization
CS 482 Information & Knowledge Management Systems

In addition, they should choose at least two courses from the following:

CS 422 Introduction to Data Mining
CS 429 Introduction to Information Retrieval Systems
CS 481 Artificial Intelligence: Language Understanding

Electrical and Computer Engineering

Department Web site: www.iit.edu/engineering/ece

The Department of Electrical and Computer Engineering offers the 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 advisor and department chair (for more details, see pages 158–162).

- Air Force Aerospace Studies
- Applied Mathematics
- Applied Solid State Physics
- Business
- Energy/Environment/Economics (E^3)
- Military Science
- Naval Science
- Premedical Studies for Electrical Engineering
- 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 electives.

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.

Faculty

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Associate Chair,
EE and CPE Program Director
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Professors
Emadi, Saniie, Shahidehpour, Wernick, Williamson, Wong, Yang

Associate Professors
Anastasio (jointly with Biomedical Engineering), Anjali, Atkin, Flueck, Li

Assistant Professors
Brankov, Cheng, Choi, Khaligh, J. Kim, Krishnamurthy, Oruklu, Ren, Wang, Xu, Yetik, Zhou

Senior Lecturers
Borkar, Modir Shanechi

Adjunct Professors
Briley, Kavicky, Nagel, Nordin, Wiedman

Faculty Emeriti
Armington, Arzbaecher, Saletta, Stark, Weber

Electrical Engineering

Department Web site: www.iit.edu/engineering/ece

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

Bachelor of Science in Electrical Engineering

Required Courses	Credit Hours
Electrical Engineering Requirements ECE 100, 211, 213, 218, 242, 307, 308, 311, 312, 319	36
Professional ECE Electives	17
Mathematics Requirements MATH 151, 152, 251, 252, 333, 474	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Engineering Science Course Requirement MMAE 200 or MMAE 320	3
Computer Science Requirements CS 115, 116	4
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Science Elective BIOL 107, BIOL 115, MS 201, or CHEM 126	3
Technical Elective	3
Interprofessional Projects	6
Total Hours	**131**

Electrical Engineering Curriculum

Semester 1		Credits
ECE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 122	Principles of Chemistry I	3
CS 115	Object-Oriented Programming I	2
Humanities 100-level Course		3
Total Hours		**16**

Semester 2		Credits
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 116	Object-Oriented Programming II	2
Science Elective*		3
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
Total Hours		**15**

Semester 4		Credits
MATH 251	Multivariate & Vector Calculus	4
PHYS 224	General Physics III	3
ECE 213	Circuit Analysis II	4
ECE 242	Digital Computers and Computing	3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 5		Credits
MATH 333	Matrix Algebra and Complex Variables	3
ECE 307	Electrodynamics	4
ECE 311	Engineering Electronics	4
IPRO 497	Interprofessional Project I**	3
Humanities Elective (300+)		3
Total Hours		**17**

Semester 6		Credits
ECE 308	Signals and Systems	3
ECE 312	Electronic Circuits	4
ECE 319	Fundamentals of Power Engineering	4
MATH 474	Probability and Statistics	3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 7		Credits
IPRO 497	Interprofessional Project II**	3
Professional ECE Elective†		3
Professional ECE Elective†		4
Technical Elective ††		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 8	Credits
Professional ECE Elective†	3
Professional ECE Elective†	4
Professional ECE Elective†	3
Engineering Science Elective***	3
Humanities or Social Sciences Elective	3
Total Hours	**16**

Total Credit Hours **131**

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

** Interprofessional projects may be taken at any time during the sophomore, junior or senior years. (Course scheduling must be adjusted accordingly with advisor approval.) IPROs are subject to the approval of a student's academic advisor. At least one IPRO should have significant (at least 75 percent) technical content and be viewed as a technical IPRO with the same definition as a technical elective.

*** Engineering science elective: Choose either MMAE 200 or MMAE 320.

† 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 advisor and the ECE department chair. At least two of the electives must contain laboratories. A maximum of three credits of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as professional ECE electives with advisor approval.

†† Advisor-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).

Computer Engineering

Department Web site: www.iit.edu/engineering/ece

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

Bachelor of Science in Computer Engineering

Required Courses	Credit Hours
ECE Major Requirements ECE 100, 211, 213, 218, 242, 311, 441, 485	28
Computer Science Major Requirements CS 115, 116, 330, 331, 351, 450, 487	19
Mathematics Requirements MATH 151, 152, 251, 252, 474, Junior mathematics elective (MATH 333 or 350)	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Engineering Course Requirement MMAE 200 or MMAE 320	3
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Junior Computer Engineering Elective ECE 307, 308, 312, or 319	3/4
Science Elective BIOL 107, BIOL 115, MS 201, or CHEM 126	3
Professional Electives	9/12
Interprofessional Projects	6
Total Hours	**130/134**

Computer Engineering Curriculum

Semester 1		Credits
ECE 100	Interprofessional Project	3
MATH 151	Calculus I	5
CHEM 122	Principles of Chemistry I	3
CS 115	Object-Oriented Programming I	2
Humanities 100-level Course		3
Total Hours		**16**

Semester 2		Credits
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 116	Object-Oriented Programming II	2
Social Sciences Elective		3
Science Elective*		3
Total Hours		**17**

Semester 3		Credits
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
CS 331	Data Structures and Algorithms	3
Total Hours		**18**

Semester 4		Credits
MATH 251	Multivariate & Vector Calculus	4
PHYS 224	General Physics III	3
ECE 213	Circuit Analysis II	4
ECE 242	Digital Computers and Computing	3
CS 330	Discrete Structures	3
Total Hours		**17**

Semester 5		Credits
ECE 311	Engineering Electronics	4
CS 351	Systems Programming	3
Engineering Science Elective**		3
Junior Mathematics Elective***		3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
CS 450	Operating Systems I	3
MATH 474	Probability and Statistics	3
IPRO 497	Interprofessional Project I†	3
Junior CPE Elective****		3/4
Social Sciences Elective (300+)		3
Total Hours		**15/16**

Semester 7		Credits
ECE 441	Microcomputers	4
ECE 485	Computer Organization and Design*****	3
CS 487	Software Engineering I	3
Professional ECE Elective††		3/4
Humanities or Social Sciences Elective		3
Total Hours		**16/17**

Semester 8		Credits
IPRO 497	Interprofessional Project II†	3
Professional ECE Elective††		3/4
Hardware-design Elective†††		3/4
Humanities Elective (300+)		3
Social Sciences Elective (300+)		3
Total Hours		**15/17**

Total Credit Hours **130/134**

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

** Engineering science elective: Choose either MMAE 200 or MMAE 320.

*** Junior mathematics elective: Choose either MATH 333 or MATH 350.

**** Junior CPE elective: Choose one of ECE 307, 308, 312, or 319.

***** CS 470 may be substituted with advisor approval.

† Interprofessional projects may be taken at any time during the sophomore, junior or senior years. (Course scheduling must be adjusted accordingly with advisor approval.)

†† 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 credits of Undergraduate Research (ECE 491) or Special Problems (ECE 497) may be used as a professional elective with advisor approval.

††† Hardware-design elective must be ECE 429 or ECE 446.

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 IIT with a significant number of advanced placement credits may be able to complete both degrees in four years.

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

Required Courses	Credit Hours
Electrical Engineering Requirements ECE 100, 211, 213, 218, 242, 307, 308, 311, 312, 319, (429 or 446), 441, 485	47
Computer Engineering Requirements CS 115, 116, 330, 331, 351, 450, 487	19
Mathematics Requirements MATH 151, 152, 251, 252, 333, 474	24
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 122	3
Engineering Science Course Requirement MMAE 200 or MMAE 320	3
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Science Elective BIOL 107, BIOL 115, MS 201, or CHEM 126	3
Professional ECE Electives	9/10
Interprofessional Projects	6
Total Hours	**146/147**

B.S.E.E./B.S.CP.E. Engineering

Semester 1		Credits
ECE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 122	Principles of Chemistry I	3
CS 115	Object-Oriented Programming I	2
Humanities 100-level Course		3
Total Hours		**16**

Semester 2		Credits
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 116	Object-Oriented Programming II	2
Science Elective*		3
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MATH 252	Introduction to Differential Equations	4
PHYS 221	General Physics II	4
ECE 211	Circuit Analysis I	4
ECE 218	Digital Systems	3
CS 331	Data Structures and Algorithms	3
Total Hours		**18**

Semester 4		Credits
MATH 251	Multivariate & Vector Calculus	4
PHYS 224	General Physics III	3
ECE 213	Circuit Analysis II	4
ECE 242	Digital Computers and Computing	3
CS 330	Discrete Structures	3
Total Hours		**17**

Semester 5		Credits
MATH 333	Matrix Algebra and Complex Variables	3
ECE 307	Electrodynamics	4
ECE 311	Engineering Electronics	4
IPRO 497	Interprofessional Project I	3
CS 351	Systems Programming	3
Total Hours		**17**

Semester 6		Credits
ECE 308	Signals and Systems	3
ECE 312	Electronic Circuits	4
ECE 319	Fundamentals of Power Engineering	4
Engineering Science Elective**		3
Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 7		Credits
ECE 441	Microcomputers	4
CS 450	Operating Systems	3
MATH 474	Probability and Statistics	3
IPRO 497	Interprofessional Project II	3
Humanities Elective (300+)		3
Total Hours		**16**

Semester 8		Credits
ECE 429	Introduction to VLSI Design	
OR		4
ECE 446	Advanced Logic Design	
ECE 485	Computer Organization and Design***	3
CS 487	Software Engineering	3
Professional ECE Elective†		3
Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 9	Credits
Professional ECE Elective†	3/4
Professional ECE Elective†	3
Humanities Elective (300+)	3
Humanities or Social Sciences Elective	3
Total Hours	**12/13**

Total Credit Hours **146/147**

* Science elective must be BIOL 107, BIOL 115, CHEM 126, or MS 201.

** Engineering science elective: Choose either MMAE 200 or MMAE 320.

*** CS 470 may be substituted with advisor approval.

† ECE 400-level course with (P) designation and except for ECE 448. A maximum of three credits of either ECE 491 or ECE 497.

Lewis Department of Humanities

Department Web site: www.iit.edu/csl/hum

The Lewis Department of Humanities offers Bachelor of Science degrees in Humanities (HUM), Journalism of Technology, Science & Business (JTSB), and Professional and Technical Communication (PTC). The HUM degree is a flexible liberal arts degree with an emphasis on the humanistic study of technology. The JTSB degree is a science/mathematics/business-intensive program which also features a strong journalism/writing component. The PTC degree provides students with both a liberal arts education in communication and culture and an applied professional education in a technical communication field. The department offers courses in art and architectural history, communication, English as a second language, history, languages and linguistics, literature, and philosophy.

The Humanities department also offers academic minors in communication, English language and literature, history, linguistics, literature, logic and philosophy of science, philosophy, professional and technical communication, and Web communication. Minors in law and society, legal studies, technology and human affairs, and urban studies are 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 IIT students to formulate and to express ideas. 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 IIT'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 IIT's pre-professional degree programs.
- To enable all IIT 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 moral foundations of human experience, particularly as reflected in history, literature and philosophy.

IIT students are encouraged to broaden their educational backgrounds and to discover new interests through the study of humanities.

The Humanities department considers the advising of students an important obligation. Each semester, all students majoring in HUM, JTSB, or PTC must meet with their faculty advisors during the advising period. Students must closely adhere to course prerequisites to maximize academic performance and satisfy requirements of the degree programs.

Faculty

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Associate Professors
Broadhead, Snapper

Assistant Professors
Bauer, Hemphill, Otterbacher, Stolley

Senior Lecturers
Dabbert, Pulliam

Instructor
Glassman

Faculty Emeriti
Applebaum, Feinberg, Harrington, Irving, Zesmer

Bachelor of Science in Humanities

IIT'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 professional programs in law and medicine.

Within this major, students can choose concentrations in literature, linguistics, philosophy, history, and communication. Students who choose philosophy, for example, would take all major electives and independent study courses in philosophy and add these to the two required philosophy courses, for a total of 30 hours in philosophy.

This degree has three components:

- General Education (47 hours)
- Major Coursework (33 hours)
- Minor*/Second Major/Free Electives (46 hours)

Bachelor of Science in Humanities

1. **General Education**
   (47 hours)
   Where unspecified, follow the bulletin guidelines.

   Basic Writing Proficiency
   Mathematics (5 hrs)
   Computer Science (2 hrs)
   Humanities and Social
   or Behavioral Sciences (21 hrs)
   Natural Science or Engineering (11 hrs)
   Interprofessional Projects (6 hrs)
   ITP: Introduction to the Profession (2 hrs)

2. **The Major**
   (33 hours)
   Eleven courses in art and architectural history, communication, history, literature, philosophy, or courses offered by other departments that are approved by the student's HUM major advisor. 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 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 general education humanities requirements, and must be chosen in consultation with the student's academic advisor.

   For multiple majors, up to two courses may in some cases be double-counted as applying to both humanities general education and the humanities major.

3. **Minor*/2nd Major/Free Electives**
   (46 hours)

Total Hours: 126

* Students accepted into the Honors Pre-Law Program forego the minor and most free electives and take all other coursework in the first three years.

Sample Curriculum for Honors Law Program Students

Semester 1		Credits
MATH 151	Calculus I	5
BIOL 107	General Biology	3
BIOL 109	General Biology Laboratory	2
PS 101	Introduction to the Profession	2
Humanities 100-level Elective		3
Total Hours		**15**

Semester 2		Credits
BIOL 115	Human Biology	3
CS 105	Intro to Computer Programming I	2
Major Elective		3
Major Elective		3
Humanities Elective (300+)		3
Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
PHYS 211	Basic Physics I	3
Major Elective		3
Major Elective		3
Humanities Elective (300+)		3
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 4	Credits
Interprofessional Project I	3
Major Elective	3
Major Elective	3
Free Elective	3
Free Elective	3
Social Sciences Elective (300+)	3
Total Hours	**18**

Semester 5	Credits
Interprofessional Project II	3
Major Elective	3
Major Elective	3
Major Elective	3
Social Sciences Elective (300+)	3
Total Hours	**15**

Semester 6	Credits
Major Elective	3
Major Elective	3
Major Elective	3
Free Elective	3
Free Elective	3
Free Elective	3
Total Hours	**18**

Semester 7	Credits
Courses at Chicago-Kent College of Law	
Total Hours	**14**

Semester 8	Credits
Courses at Chicago-Kent College of Law	
Total Hours	**14**

Total Credit Hours **126**

Bachelor of Science in Professional and Technical Communication (PTC)

Web site: www.iit.edu/csl/hum

The Professional and Technical Communication program helps students develop their writing skills, sensitivity to the social and cultural aspects of communication, fluency with the latest computer technologies, and strategies for information design. Students in this major will therefore take a number of courses in IIT's computer classrooms with state-of-the-art hardware and software. The required ethics component focuses on moral issues in communication, business, engineering or computer science. Finally, elective coursework in science, technology and society (STS) gives students awareness of the power of language and image to shape thoughts, values, and actions in a variety of public, private, and professional contexts.

The Internet Communication (*iCOM*) specialization brings together coursework in technical writing, communication, web design, ethics, science and technology in society, along with a minor in computer networking, to train Internet professionals.

Required Courses	Credit Hours
Communication Requirements COM 421 (or 423), 424, 425, 428	12
One of the following three 9-credit sequences:	9
WebCom Sequence COM 430, 431, 432 *(Sequence required for iCOM specialization)*	
Engineering Graphics Sequence EG 225, 325, 425	
Architectural CAD Sequence ARCH 125 and two CAD Elects*	
Computer Science Requirement CS 105 *(CS 201 or (CS 115 and 116)* *required for iCOM specialization*)	2
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Introduction to the Profession	2
Natural Science and Engineering Requirements For general education requirements, see page 25.	11
Mathematics Requirements For general education requirements, see page 25. *MATH 151 required for iCOM specialization*	5
Interprofessional Projects	6
PTC (technical) Electives	9
AAH or ARCH Elective AAH 119, AAH 120, AAH 301, or ARCH 331	3
Science, Technology, and Society Electives	12
Minor Electives *CS Networking minor required for iCOM specialization*	15
Linguistics Elective	3
Ethics Elective	3
Free Electives	15
Total Hours	**128**

* Chosen in consultation with advisor.

PTC Curriculum

Semester 1		Credits
Introduction to the Profession		2
MATH 151	Calculus I	5
Natural Science or Engineering Elective		4
Humanities 100-level Elective		3
Social Sciences Elective		3
Total Hours		**17**

Semester 2		Credits
CS 105	Intro to Computer Programming I	2
Natural Science or Engineering Elective		4
Linguistics Elective		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 3	Credits
PTC (technical) Elective	3
Natural Science or Engineering Elective	3
AAH or ARCH Elective*	3
Ethics Elective**	3
Social Sciences Elective (300+)	3
Free Elective	3
Total Hours	**18**

Semester 4	Credits
Minor Elective	3
PTC (technical) Elective	3
STS Elective**	3
Humanities Elective (300+)	3
Free Elective	3
Total Hours	**15**

Semester 5		Credits
COM 421	Technical Writing	
OR		3
COM 423	Writing Workplace	
COM 430	Intro to Web Design/Site Management	
OR		
EG 225	Engineering Graphics	3
OR		
ARCH 125	Introduction to Architectural Computing	
IPRO 497	Interprofessional Project I	3
Minor Elective		3
STS Elective**		3
Social Sciences Elective (300+)		3
Total Hours		**18**

Semester 6		Credits
COM 424	Document Design	3
COM 431	Intermediate Web Design/Site Mngmnt	
OR		
EG 325	Adv Eng Graphics for Non-Engineers	3
OR		
CAD Elective**		
Minor Elective		3
Humanities or Social Sciences Elective		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
COM 432	Advanced Web Design/Site Management	
OR		
EG 425	Computer Graphics for Non-Engineers	3
OR		
CAD Elective**		
COM 425	Editing	3
IPRO 497	Interprofessional Project II	3
Minor Elective		3
STS Elective**		3
Total Hours		**15**

Semester 8		Credits
COM 428	Verbal and Visual Communication	3
Minor Elective		3
PTC (technical) Elective		3
STS Elective**		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **128**

* Choose from AAH 119, AAH 120, AAH 301, ARCH 331.

** Chosen in consultation with advisor.

Bachelor of Science in Journalism of Technology, Science and Business (JTSB)

Journalism is possibly the most important occupation in a free and democratic society and the demand for journalists is increasing as news outlets proliferate. Today, in addition to newspapers and magazines, there is news on radio, television, cable, satellite TV and radio, web sites, and even cell phones and iPods. As the number and types of news outlets increase, many are also specializing in science, technology, and business. The JTSB degree program meets this specialized demand by incorporating IIT's considerable resources in the sciences, business, engineering, and other technological areas with the Humanities department's strengths in communication and STS (science and technology in society). This is a rigorous curriculum: our students go above and beyond the minimum general education requirements in mathematics, the sciences and engineering, computer science, business, communication and humanities courses. By educating strong writers who have a clear understanding of science, technology, and business, and the way such disciplines relate to society, the JTSB program gives its graduates a competitive edge in the workplace.

Required Courses	Credit Hours
Journalism Requirements COM 372, 373, 377, 421, 425, 435, 440	21
Journalism Electives and Supervised Field Projects	8
Technology, Science, and Business Electives*	15-16
Science, Technology, and Society Electives	6
Business Requirements BUS 205, 210, ECON 211	9
Mathematics Requirements MATH 151, 152	10
Science Requirements BIOL 107, CHEM 124, PHYS 123	11
Science Elective* BIOL 115, CHEM 125, 126, or PHYS 221	3-4
Humanities and Social Science Requirements For general education requirements, see page 25.	21
Introduction to the Profession	2
Interprofessional Projects	6
Computer Science Requirements CS 115, 116, 331	7
Free Electives	9
Total Hours	**129**

* Students who complete a 3-credit-hour science elective must complete 16 credit hours of Science, Technology, and Business Electives.

Journalism of Technology, Science and Business Curriculum

Semester 1		Credits
Introduction to the Profession		2
BIOL 107	General Biology	3
MATH 151	Calculus I	5
CS 115	Object-Oriented Programming I	2
Humanities 100-level Elective		3
Total Hours		**15**

Semester 2		Credits
CHEM 124	Principles of Chemistry I	4
ECON 211	Principles of Economics	3
COM 372	Mass Media and Society	3
MATH 152	Calculus II	5
CS 116	Object-Oriented Programming II	2
Total Hours		**17**

Semester 3		Credits
PHYS 123	General Physics I	4
COM 377	Communication Law and Ethics	3
BUS 205	Business Basics	3
CS 331	Data Structures and Algorithms	3
Social Sciences Elective		3
Total Hours		**16**

Semester 4		Credits
BIOL 115	Human Biology*	
OR		
CHEM 125	Principles of Chemistry II	3/4/4
OR		
PHYS 221	General Physics II	
COM 440	Introduction to Journalism	3
STS Elective		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**15/16**

Semester 5		Credits
COM 373	Writing about Science, Tech, and Bus	3
BUS 211	Fin Accounting and External Reporting	3
IPRO 497	Interprofessional Project I	3
TSB Elective		3
Supervised Field Project		1
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
COM 435	Intercultural Communication	3
TSB Elective		3
TSB Elective		3
Journalism Elective		3
Supervised Field Project		1
Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 7		Credits
COM 421	Technical Communication	3
IPRO 497	Interprofessional Project II	3
TSB Elective		3
STS Elective		3
Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**18**

Semester 8		Credits
COM 425	Editing	3
TSB Elective*		3/4
Journalism Elective		3
Humanities Elective		3
Free Elective		3
Total Hours		**15/16**

Total Credit Hours **129**

* Students who complete a 3-credit-hour science elective must complete 16 credit hours of Science, Technology, and Business Electives.

Industrial Technology and Management–School of Applied Technology

Department Web site: www.iit.edu/cpd/intm

The objective of the Bachelor of Industrial Technology and Management (BINTM) program is to prepare skilled adults for managerial positions in industry. This is a completion program designed for working individuals who have technical training in manufacturing or industrial specialties. The program enables students to build upon existing skills, improve their technical capabilities, and thereby expand their career opportunities.

To accommodate full-time work schedules, courses are offered evenings and Saturdays at IIT's Main Campus in Chicago, IIT's Rice Campus in Wheaton, Illinois, and via the Internet for students who are unable to attend live classes.

The program offers four professional specializations: Industrial Facilities (IF), Industrial Logistics (IL), Manufacturing Technology (MT), and Telecommunication Technology (TT). Students have the option to complete a specialization or alternatively take courses from more than one specialization area. The core curriculum covers material applicable to all industrial sectors. This approach allows students to optimize course selection in regards to individual career objectives.

The ideal candidate for this program is a person who is already working within or has strong interest in these industries. This degree provides a broad background that 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. Nominally, a minimum of 60 semester hours from an accredited college is required for admission (only courses graded C or better are accepted for transfer). Those who have accrued at least 45 hours towards admission requirements may be admitted with the condition that all outstanding requirements be completed within two years of starting the program. Candidates with more than 60 hours of transferable credit may qualify to have excess credit applied towards INTM coursework.

A three-course INTM certificate program is available for individuals interested in improving management and decision-making skills. The courses are part of the regular curriculum and can be applied toward the BINTM degree.

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Admissions Requirements

Candidates must complete an application for undergraduate admission and submit official transcripts from all colleges attended, one letter of recommendation, and a personal statement. The BINTM program nominally requires the transfer of 60 semester hours as outlined in the following admission requirements.

Mathematics
Six credit hours at the level of college algebra or above.

Computer Science
Three credit hours of computer programming.

Natural Science
Eleven 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 graphics/drafting. In some cases, certain technology courses might be applied to this requirement.

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. A minimum of three credit hours in each category is required.

Technical coursework
Thirty-one 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).

Industrial Technology and Management Curriculum

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 IIT 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 accomodate full-time work schedules of students.

The core curriculum (14 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 science electives and an Interprofessional Project. Students also complete four (4) technical electives and four (4) specialization electives, which provide in-depth coverage of specific aspects of industrial organizations and their related sectors. Students have the option to complete a formal specialization or alternatively to choose electives from more than one specialization area.

Four specializations are available:

Industrial Facilities (IF)
Covers construction, project management, and renovation and maintenance of buildings, facilities and equipment.

Industrial Logistics (IL)
Covers supply chain management, ware-housing and distribution, purchasing, and export/import activities.

Manufacturing Technology (MT)
Covers manufacturing processes, mechanical technology, and quality control.

Telecommunication Technology (TT)
Covers management and maintenance of data networks, network configurations, network security, and evolving technologies, including Voice over IP.

Bachelor of Industrial Technology and Management

Required Courses	Credit Hours
Admission Requirements	60
Industrial Technology Requirements INTM 301, 315, 404, 408, 409, 410, 414, 432, 477	27
Technical Electives	12
Specialization Electives	12
Humanities Electives 300/400 level courses	6
Social Sciences Electives 300/400 level courses	6
Interprofessional Project	3
Total Hours	**126**

Industrial Technology and Management

A suggested program based on half-time attendance. Students may complete coursework at their own pace.

Semester 1	Credits
INTM 301 Communications for the Workplace	3
INTM 315 Industrial Enterprises	3
INTM 414 Topics in Industry	3
Total Hours	**9**

Semester 2	Credits
INTM 410 Operations Management	3
Technical Elective*	3
Humanities Elective (300+)	3
Total Hours	**9**

Semester 3	Credits
INTM 404 Sales, Marketing and Product Intro	3
Technical Elective*	3
Total Hours	**6**

Semester 4	Credits
INTM 477 Entrepreneurship in Industry	3
Technical Elective*	3
Social Sciences Elective (300+)	3
Total Hours	**9**

Semester 5	Credits
INTM 409 Inventory Control	3
Specialization Elective	3
Technical Elective*	3
Total Hours	**9**

Semester 6	Credits
INTM 432 Vendor/Customer Relations	3
Specialization Elective	3
Social Sciences Elective (300+)	3
Total Hours	**9**

Semester 7	Credits
INTM 408 Cost Management	3
Specialization Elective	3
Humanities Elective (300+)	3
Total Hours	**9**

Semester 8	Credits
Interprofessional Project	3
Specialization Elective	3
Total Hours	**6**

Total Credit Hours **66**

* **Technical Electives:**

INTM 314 Maintenance Technology and Management
INTM 319 Electronics in Industry
INTM 322 Industrial Project Management
INTM 418 Industrial Risk Management
INTM 420 Applied Strategies for the Competitive Enterprise
INTM 425 Human Resource Management
INTM 427 E-Commerce
INTM 441 Supply Chain Management
INTM 446 Manufacturing and Logistics Information Systems
INTM 460 The Carbon Economy
INTM 461 Energy Options for Industry

Specializations in Industrial Technology and Management

To earn a specialization, students must complete four courses within one specialization.

Industrial Facilities (IF)

INTM 407 Construction Technology
INTM 413 Facilities and Construction Management
INTM 415 Advanced Project Management
INTM 417 Construction Estimating

Industrial Logistics (IL)

INTM 430 Transportation
INTM 441 Supply Chain Management
INTM 442 Warehousing and Distribution
INTM 443 Purchasing
INTM 444 Export/Import Management
INTM 446 Manufacturing and Logistics Information Systems

Manufacturing Technology (MT)

INTM 406 Quality Control in Manufacturing
INTM 412 Manufacturing Processes for Metals and Mechanical Systems
INTM 422 Mechanical Technology
INTM 431 Manufacturing Processes for Electronics/Electrical Systems
INTM 433 Manufacturing Processes for Chemical Process Systems

Telecommunication Technology (TT)

ITM 440 Introduction to Data Networks and the Internet
ITM 441 Network Applications and Operations
ITM 448 System and Network Security
ITM 449 Telecommunications over Data Networks

Certificate in Industrial Technology and Management

The three-course INTM certificate provides an introduction to industrial organizations and how they operate.

Students must complete the following courses:

INTM 315 Industrial Enterprises
INTM 322 Industrial Project Management
INTM 410 Operations Management

Information Technology and Management–School of Applied Technology

Department Web site: www.iit.edu/cpd/itm

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.

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 thirty 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 program produces graduates who can make information technology work in a wide range of settings, create digital content for that infrastructure and provide support to the individuals who use it. The goal of the program is to provide students with up-to-date knowledge of the technologies in use in today's workplace and at the same time equip them to manage those technologies. Courses are taught by professionals who work in the field and are in tune with the latest currents in information technologies.

Entering the program as a first-year student requires the completion of additional courses in technical communication, psychology, engineering graphics, and a minor. The minor may be in a field which will compliment 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.

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 60 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.

Faculty and Staff

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Industry Associate Professors
Kimont, Scarlata

Adjunct Assistant Professor
Gehrs

Adjunct Industry Professors
A. Friedman, Goins, P. Gupta, Hendry, D. Hood, Joiner, Slater, Vaccaro

Adjunct Industry Associate Professors
Bartek, Hajek, Kandemir, M. Kozi, J. Meyers, Shamsuddin

Transfer Admission Requirements

Admitted transfer students are expected to have satisfied the following General Education Requirements prior to admission. If not, the student must complete them while working on the ITM degree. The degree requires 126 semester hours including transfer and coursework completed at IIT.

Basic Writing Proficiency Requirement
Students must take the IIT English Proficiency Examination before beginning classes at IIT. Within their first year at IIT, students who do not pass the IIT English Proficiency Examination must demonstrate basic writing proficiency by passing a composition course at IIT.

Natural Science or Engineering
Eleven semester hours of natural science or engineering courses. Relevant science courses include physics, chemistry, astronomy, or biology. 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.

Computer Science
Two credit hours of computer programming; may be satisfied by taking ITM 311.

Humanities and Social Sciences
Nine semester 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 semester hours in Humanities and three semester hours in the Social Sciences.

Mathematics
Five semester hours of mathematics at the level of MATH 119 or above; Probability and Statistics is highly recommended. Students who enter the program with less than sixty hours of total transfer credit or less than five hours of mathematics credit will be required to take BUS 221, Statistics for Managerial Decision Making.

Free or Technical Electives
Thirty-three semester hours of approved courses. Students should contact Undergraduate Academic Affairs for additional information.

Bachelor of Information Technology and Management

Transfer students are required to take 69 semester hours at IIT and transfer 60 semester hours to complete the bachelor's degree for a total of 129 semester hours. This includes 17 information technology courses for a total of 51 semester hours in the major. An additional 18 semester hours outside the major must be taken at IIT in order to satisfy the remaining IIT General Education Requirements. These include four 300/400-level humanities and social science electives and two IPRO courses. Two social science electives must be from the same field and one must be from a different field; lower level social science electives count towards this requirement. The computer science general education requirement may be satisfied by completion of ITM 311. Students who enter the program with less than sixty hours of total transfer credit or less than five hours of mathematics credit will be required to take BUS 221, Statistics for Managerial Decision Making.

All students must complete a minimum of 42 semester hours of courses with a significant written and oral communication component, identified with a (C) in the bulletin; 15 hours of (C)-coded courses must be taken in the major.

Entering the Bachelor of Information Technology and Management program as a first-year student requires the completion of 126 to 130 hours of coursework (depending on mathematics placement) which must include a minor. ITM students completing a minor are strongly encouraged to consider minors which complement their primary program of study; these include (but are not limited to) Industrial Logistics; Industrial Facilities; Manufacturing Technology; Business, Professional and Technical Communications; Management; Technology and Human Affairs; Circuits and Systems; Computer Architecture; and ROTC. Courses taken to fulfill a minor requirement may not also be used as electives in the major.

Current IIT students, who entered as first year students, and are changing their major to Information Technology and Management from another major are expected to the meet the same requirements as students entering the Bachelor of Information Technology and Management program as first-year students, except that the minor requirement may be waived.

A maximum of nine 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.

Bachelor of Information Technology and Management (Transfer, Part-Time Program)

Required Courses	Credit Hours
Courses Transferred (or taken at IIT)	60
Humanities Electives 300/400 level courses required	6
Social Sciences Elective 300/400 level courses required	6
Interprofessional Projects	6
ITM Requirements ITM 301, 302, 311, 312, 411, 421, 434, 440, 448, 461, 471	33
ITM Electives	18
Total Hours	**129**

Information Technology and Management Curriculum

(students entering as transfer, part-time)

Semester 1		Credits
ITM 301	Contemporary Op Sys/Hardware I	3
ITM 311	Intro to Software Development	3
ITM 421	Data Modeling and Applications	3
Total Hours		**9**

Semester 2		Credits
ITM 302	Contemporary Op Sys/Hardware II	3
ITM 312	Intro to Systems Software Programming	3
Humanities Elective (300+)		3
Total Hours		**9**

Semester 3		Credits
ITM 411	Intermediate Software Development	3
ITM 440	Intro to Data Networks and the Internet	3
Social Sciences Elective (300+)		3
Total Hours		**9**

Semester 4		Credits
ITM 448	Systems and Network Security	3
ITM 461	Internet Technologies and Web Design	3
Humanities Elective (300+)		3
Total Hours		**9**

Semester 5		Credits
ITM 434	Human/Computer Interaction	3
ITM Elective		3
Social Sciences Elective (300+)		3
Total Hours		**9**

Semester 6		Credits
ITM 471	Project Management for Info Technology	3
IPRO 497	Interprofessional Project I	3
ITM Elective		3
Total Hours		**9**

Semester 7		Credits
IPRO 497	Interprofessional Project II	3
ITM Elective		3
ITM Elective		3
Total Hours		**9**

Semester 8	Credits
ITM Elective	3
ITM Elective	3
Total Hours	**6**

Total Credit Hours **69**

Bachelor of Information Technology and Management (Program for First-Year Students)

Required Courses	Credit Hours
ITM Requirements ITM 100, 301, 302, 311, 312, 411, 421, 434, 440, 448, 461, 471	35
ITM Electives	18
Mathematics Requirements* BUS 221, MATH 120 & 121 OR MATH 148 & 149 OR MATH 151	8-12
Engineering Requirement EG 225	3
Natural Science and Engineering Requirements For general education requirements, see page 25.	8
Humanities and Social Sciences Requirements	21
Psychology Requirement PSYC 301	3
Technical Communication Requirement COM 421	3
Interprofessional Projects	6
Minor Electives	15
Free Electives	6
Total Hours	**126-130**

* Choose from MATH 120 & 121, MATH 148 & 149, or MATH 151.

Information Technology and Management Curriculum

(program for first-year students)

Semester 1		Credits
EG 225	Engineering Graphics for Non-Engineers	3
Freshman MATH sequence Elective*		3-5
Natural Science or Engineering Elective		4
Humanities or Social Sciences Elective		3
Total Hours		**13-15**

Semester 2		Credits
ITM 100	Introduction to the Profession	2
ITM 301	Contemporary Op Sys/Hardware I	3
ITM 311	Intro to Software Development	3
Freshman MATH sequence Elective*		3-5
Natural Science or Engineering Elective		4
Total Hours		**15-17**

Semester 3		Credits
ITM 302	Contemporary Op Sys/Hardware II	3
ITM 312	Introduction to Systems Software Prog	3
ITM 461	Internet Technologies and Web Design	3
Minor Elective		3
Humanities 100-level Elective		3
Social Sciences Elective		3
Total Hours		**18**

Semester 4		Credits
ITM 434	Human/Computer Interaction	3
ITM 440	Intro to Data Networks and the Internet	3
ITM 441	Intermediate Software Development	3
BUS 221	Statistics for Managerial Decision Making	3
Minor Elective		3
Minor Elective		3
Total Hours		**18**

Semester 5		Credits
ITM 448	System and Network Security	3
PSYC 301	Industrial Psychology	3
ITM Elective		3
ITM Elective		3
Humanities Elective (300+)		3
Free Elective		2
Total Hours		**17**

Semester 6		Credits
ITM 421	Data Modeling and Applications	3
COM 421	Technical Writing	3
IPRO 497	Interprofessional Project	3
Social Sciences Elective (300+)		3
Minor Elective		3
Total Hours		**15**

Semester 7		Credits
ITM 471	Project Management for Info Technology	3
Minor Elective		3
ITM Elective		3
Humanities Elective (300+)		3
Free Elective		3
Total Hours		**15**

Semester 8		Credits
IPRO 497	Interprofessional Project	3
Minor Elective		3
ITM Elective		3
ITM Elective		3
Social Sciences Elective (300+)		3
Total Hours		**15**

Total Credit Hours **126-130**

* Choose from MATH 120 & 121, MATH 148 & 149, or MATH 151.

Information Technology Curriculum Specializations

The ITM electives may be chosen from one or more of the following course specializations. With the permission of the advisor, other undergraduate or graduate courses in the same area may be substituted for courses in a specialization.

Systems Security

Focuses on application, data, and network security and the management of information technology security.

ITM 443 Vulnerability Analysis and Control
ITM 451 Distributed Workstation System Administration
OR
ITM 452 Client-Server System Administration
ITM 458 Operating System Security
ITM 478 Information Systems Security Management

Data Management

Focuses on the design, development and administration of traditional and Internet-based data management.

ITM 422 Advanced Database Management
ITM 428 Database Security
ITM 444 Cloud Computing Technologies
ITM 462 Web Site Application Development

Web Design and Application Development

Focuses on the design and development of fully-interactive web sites and applications for Internet deployment.

ITM 441 Network Applications and Operations
ITM 462 Web Site Application Development
ITM 465 Rich Internet Applications
OR
ITM 469 Topics in Application Development
ITM 466 Service Oriented Architecture

IT Entrepreneurship and Management

Focuses on the managerial and entrepreneurial skills needed to launch a new enterprise.

ITM 441 Network Applications and Operations
BUS 210 Financial and Managerial Accounting
BUS 301 Theory of Organization and Management
BUS 305 Operations Management
BUS 371 Introduction to Marketing

Software Development

Focuses on programming and the development of sophisticated applications.

ITM 412 Advanced Structured and System Programming
OR
ITM 419 Topics in Software Development
ITM 413 Open Source Programming
ITM 415 Advanced Software Development
ITM 462 Web Site Application Development
ITM 478 Information System Security Management

System Administration

Focuses on the administration and management of servers.

ITM 441 Network Applications and Operations
ITM 451 Distributed Workstation System Administration
OR
ITM 452 Client-Server System Administration
ITM 454 Operating System Virtualization
OR
ITM 458 Operating System Security
ITM 456 Introduction to Open Source Operating Systems

Networking and Communications

Focuses on network applications and management.

ITM 441 Network Applications and Operations
ITM 451 Distributed Workstation System Administration
OR
ITM 452 Client-Server System Administration
ITM 478 Information System Security Management
ITM 491 Undergraduate Research

IIT/College of DuPage and IIT/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 IIT. 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 IIT.

Eligibility for the Program

Students applying to the DAP must be enrolled in one of the following programs:

At COD: Associate of Applied Science Degree in Computer Information Systems or Associate of Applied Science Degree in Computer Internetworking Technologies

At JJC: Associate of Applied Science Degree in Computer Information Systems; Network Specialist, Programming or Web Design and Administration Options

Students must have and maintain a cumulative grade point average of at least 3.0 at COD or JJC to be eligible for admission to IIT. 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 IIT and COD or JJC. Applicants must also complete the application process at both COD or JJC and IIT in order to be admitted to both institutions. The IIT application may be submitted only for a bachelor's program in Information Technology and Management. Admission to other IIT 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 re-instatement. Transcripts must be sent to the IIT Office of Educational Services each semester for each student attending COD or JJC and enrolled in the DAP. IIT 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 IIT Undergraduate Bulletin in effect at the time of admission into the DAP for the Baccalaureate Degree.

Mathematics and Science Education

Department Web site: www.iit.edu/csl/msed

The Department of Mathematics and Science Education has an education program that prepares students for a teaching certificate at the secondary level while they receive a Bachelor of Science degree in biology, chemistry, physics, applied mathematics, computer sciences, an engineering discipline, or a related field.

The department's guiding principle is that those who can, do; those who understand, teach. That is, a math or science teacher must know the subject matter as well as how to teach it. The Department of Mathematics and Science Education is a discipline-based teaching program. Students will learn how to effectively teach their chosen disciplines because the curriculum focuses on each student's chosen discipline as opposed to general education.

The program draws primarily from constructivist epistemology as a means by which knowledge is developed and fully recognizes the individual perspectives from which learners approach school and life situations. Additionally, the knowledge base utilizes contemporary research on teaching and learning and is philosophically and substantively aligned with Illinois Content Standards and the professional subject-matter organizations. Graduates of the program will be leaders in instructional innovation in mathematics and science.

The overall organizational framework for the program borrows heavily from Shulman's (1986) *Knowledge Growth in Teaching* with the ultimate focus on the Teacher as Transformer of Subject Matter. At an operational level, the program focuses on the development, revision, and elaboration of six primary domains of knowledge that both theory and research have indicated are essential for effective instruction. It is this combination of domains of knowledge that distinguishes the expert teacher from others possessing one or more of the following domains of knowledge: subject matter knowledge, pedagogical knowledge, knowledge of schools, knowledge of learners, curricular knowledge, and pedagogical content knowledge.

Within the Knowledge Growth in Teaching model, the IIT program is committed to providing students with experiences that help them develop a full range of knowledge and skills in the areas of subject matter, pedagogy, pedagogical content knowledge, schools, learners and curriculum within a framework of moral and ethical societal norms, including a commitment to equity and diversity. From a constructivist perspective, individuals are continually structuring knowledge and revising their knowledge in response to differing contexts and new knowledge/perceptions. Consequently, it is important to note that the program does not view any of the domains of knowledge as completed outcomes upon graduation. Rather, the domains provide a basis for continued lifelong professional development.

Specific Program Outcomes

Program graduates will demonstrate their knowledge of the stated domains of knowledge by

- the development of integrated and in-depth subject matter knowledge in topical areas directly relevant to teaching content specialty (Subject Matter Knowledge)
- the successful development of instructional materials/plans consistent with research on teaching/learning and supports emotional development (Pedagogical Knowledge)
- successfully working within the school and community in a manner that fosters community and state instructional goals (Knowledge of Schools)
- the development and implementation of instructional materials and plans that are consistent with current cognitive and social theories on student learning and personal development for all students regardless of their race, ethnicity, gender, sexual orientation, language, religion, socioeconomic status, and regional/geographic origins (Knowledge of Learners)
- appropriate selection of instructional/curriculum materials relative to local, state, and national curriculum goals and reforms, and exhibited ability to analyze and revise materials so that they are consistent with appropriate curriculum goals (Curricular Knowledge)
- successful development and implementation of instruction that represents current subject matter to students in a form that promotes in-depth understanding and ability to apply knowledge to new and unique situations (Pedagogical Content Knowledge)

Faculty

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Professor
N. Lederman

Associate Professors
J. Lederman, Nieswandt, Zawojewski

Assistant Professors
Berkaliev, Koehler, Meyer, Whitney

Mathematics and Science Education Secondary Science or Mathematics Teaching Certification*

Required Courses	Credit Hours
MSED 200 Analysis of Classrooms (Practicum and Seminar)	3
MSED 250 Middle & Secondary School Curriculum/Foundations	3
MSED 300 Instructional Methods/Strategies I	3
MSED 320 Inquiry and Problem Solving	3
MSED 350 Informal Education (Practicum and Seminar)	3
MSED 400 Instructional Methods/Strategies II	3
MSED 450 Professional Internship	6
Total Hours	**24**

* This program has been approved by Illinois State Board of Education.

Mechanical, Materials, and Aerospace Engineering

Department Web site: www.iit.edu/engineering/mmae

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

The objectives of the (AE/ME/MSE) undergraduate program are to prepare graduates for a broad range of professional careers and provide a foundation for advanced studies at the graduate or professional level.

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

- 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, sustainability;
- An ability to function on multidisciplinary 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.

Faculty

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Arastoopour (jointly with Chemical and Biological Engineering), Cramb (Provost and Senior Vice President for Academic Affairs), Kallend (Associate Dean, Armour College of Engineering), Meade, Nagib (Rettaliata Distinguished Professor), Nair, Nash, Ostrogorsky, Pervan, Wark, Williams, Yagoobi

Associate Professors
Cassel (Associate Chair, Graduate Studies), Clack, Gosz, Mostovoy, Qian, Raman, Rempfer, Ruiz, Tin

Assistant Professors
Peet, Shadden, Spenko, Vural, B. Wu

Lecturers
Cammino, Cesarone

Research Professor
Benedyk

Research Associate Professors
Frankfurt, Mansy

Research Assistant Professor
Hu

Adjunct Professors
Duvall, Gonczy, Lisowski, Naghshineh, G. Nash, Tatara

Faculty Emeriti
Bonthron, Breyer, Dix, Graham, Higgins, Kalpakjian, Kumar, Morkovin, Porter, Rasof, Sciammarella, Way

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 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 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 advisor 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 advisors can be found on their myIIT account.

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

Double Majors

A double major in ME and AE, ME and MSE, or AE and MSE may often be completed in one or two additional semesters. Interested students should consult their academic advisor.

Minors

Minors available to students who wish to broaden their knowledge can be found on pages 158–162.

In the Mechanical Engineering program, two of the required minor courses substitute for the two free electives.

In the Materials Science and Engineering program, four of the required minor courses substitute for the three technical electives and the one free elective. Depending on the minor chosen, it is also possible that the Engineering Elective would also be covered.

In the Aerospace Engineering program, there are no available technical or free electives, so minor course substitution is not possible.

Minors other than those listed below may be undertaken with the approval of the student's faculty advisor 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. Minors require completion of additional courses.

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

- Aerospace Science (for ME or MSE students only)
- Air Force Aerospace Studies
- Applied Mechanics (for MSE or AE students only)
- Artificial Intelligence
- Construction Management
- Electromechanical Design and Manufacturing (for ME and AE students only)
- Energy/Environment/Economics (E^3)
- Environmental Engineering
- Management
- Materials Science (for ME or AE students only)
- Military Science
- Naval Science
- Polymer Science and Engineering
- Premedical Studies
- Software Engineering

Graduate Courses

Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for course descriptions.

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.

Bachelor of Science in Mechanical Engineering

Required Courses	Credit Hours
Mechanical Engineering Requirements MMAE 100, 200, 202, 232, 302, 305, 313, 319, 320, 321, 323, 332, 350, 419, 432, 433, 443, 445, 485	59
Materials Science Requirement MS 201	3
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221	8
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Humanities and Social Sciences Electives For general education requirements, see page 25.	21
Interprofessional Projects	6
Free Electives	6
Total Hours	**127**

Mechanical Engineering Curriculum

Semester 1		Credits
MMAE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 2		Credits
MS 201	Materials Science	3
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 105	Intro to Computer Programming I	2
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MMAE 200	Introduction to Mechanics	3
MMAE 232	Design for Innovation	3
MATH 251	Multivariate & Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
MMAE 202	Mechanics of Solids II	3
MMAE 350	Computational Mechanics	3
MATH 252	Introduction to Differential Equations	4
Humanities or Social Sciences Elective (300+)		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 5		Credits
MMAE 302	Mechanics of Solids III	3
MMAE 305	Dynamics	3
MMAE 313	Fluid Mechanics	3
MMAE 320	Thermodynamics	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
MMAE 319	Mechanical Laboratory I	4
MMAE 321	Applied Thermodynamics	3
MMAE 323	Heat & Mass Transfer	3
MMAE 332	Design of Machine Elements	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 7		Credits
MMAE 419	Mechanical Laboratory II	4
MMAE 443	Systems Analysis & Control	3
MMAE 445	Computer-Aided Design	3
MMAE 485	Manufacturing Processes	3
IPRO 497	Interprofessional Project I	3
Total Hours		**16**

Semester 8		Credits
MMAE 432	Design of Mechanical Systems	3
MMAE 433	Design of Thermal Systems	3
IPRO 497	Interprofessional Project II	3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **127**

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.

Bachelor of Science in Materials Science and Engineering

Required Courses	Credit Hours
Materials Engineering Requirements MMAE 100, 200, 202, 232, 320, 365, 370, 372, 373, 463, 465, 470, 472, 476, 485	46
Materials Science Requirement MS 201	3
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Technical Electives	9
Engineering Electives	3
Humanities and Social Sciences Electives For general education requirements, see page 25.	21
Interprofessional Projects	6
Free Elective	3
Total Hours	**126**

Materials Science and Engineering Curriculum

Semester 1		Credits
MMAE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 2		Credits
MS 201	Materials Science	3
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 105	Intro to Computer Programming I	2
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MMAE 200	Introduction to Mechanics	3
MMAE 232	Design for Innovation	3
MATH 251	Multivariate & Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 4		Credits
MMAE 202	Mechanics of Solids II	3
MATH 252	Introduction to Differential Equations	4
PHYS 224	General Physics III for Engineers	3
Humanities or Social Sciences Elective (300+)		3
Free Elective		3
Total Hours		**16**

Semester 5		Credits
MMAE 320	Thermodynamics	3
MMAE 365	Structure & Properties of Materials I	3
MMAE 370	Materials Laboratory I	3
MMAE 373	Instrumentation & Measurements Lab	4
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
MMAE 372	Aerospace Materials Laboratory	3
MMAE 463	Structure and Properties of Materials II	3
MMAE 465	E&M/Optical Properties of Materials	3
Technical Elective*		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 7		Credits
MMAE 470	Introduction to Polymer Science	3
MMAE 476	Materials Laboratory II	3
MMAE 485	Manufacturing Processes	3
IPRO 497	Interprofessional Project I	3
Technical Elective*		3
Total Hours		**15**

Semester 8		Credits
MMAE 472	Advanced Aerospace Materials	3
IPRO 497	Interprofessional Project II***	3
Technical Elective*		3
Engineering Elective**		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Total Credit Hours **126**

* 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. See your faculty advisor for a determination of which courses are acceptable. In addition, ECE 218 and ECON 423 are permitted. Any substitutions require written approval by the associate chair of the department.

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

*** MSE students may satisfy a materials design experience requirement either through appropriate selection of a senior year IPRO or by taking three credit hours of MMAE 494 as a technical elective. In either case, advisor approval is required.

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.

Bachelor of Science in Aerospace Engineering

Required Courses	Credit Hours
Aerospace Engineering Requirements MMAE 100, 200, 202, 304, 311, 312, 313, 315, 320, 350, 372, 410, 411, (412 or 414), 415, (413 or 416), 443, 450, 452	59
Aerospace Engineering Elective MMAE 417 or 418 or 472	3
Materials Science Requirement MS 201	3
Mathematics Requirements MATH 151, 152, 251, 252	18
Physics Requirements PHYS 123, 221, 224	11
Chemistry Requirement CHEM 124	4
Computer Science Requirement CS 105	2
Humanities and Social Sciences Electives For general education requirements, see page 25.	21
Interprofessional Project	6
Total Hours	**127**

Aerospace Engineering Curriculum

Semester 1		Credits
MMAE 100	Introduction to the Profession	3
MATH 151	Calculus I	5
CHEM 124	Principles of Chemistry I	4
Humanities or Social Sciences Elective		3
Total Hours		**15**

Semester 2		Credits
MS 201	Materials Science	3
MATH 152	Calculus II	5
PHYS 123	General Physics I	4
CS 105	Intro to Computer Programming I	2
Humanities or Social Sciences Elective		3
Total Hours		**17**

Semester 3		Credits
MMAE 200	Introduction to Mechanics	3
MATH 251	Multivariate & Vector Calculus	4
PHYS 221	General Physics II	4
Humanities or Social Sciences Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**17**

Semester 4		Credits
MMAE 202	Mechanics of Solids II	3
MMAE 313	Fluid Mechanics without Laboratory	3
MMAE 320	Thermodynamics	3
MATH 252	Introduction to Differential Equations	4
PHYS 224	General Physics III for Engineers	3
Total Hours		**16**

Semester 5		Credits
MMAE 311	Compressible Flow	3
MMAE 312	Aerodynamics of Aerospace Vehicles	3
MMAE 315	Aerospace Laboratory I	4
MMAE 350	Computational Mechanics	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Semester 6		Credits
MMAE 304	Mechanics of Aerostructures	3
MMAE 372	Aerospace Materials	3
MMAE 443	Systems Analysis & Control	3
MMAE 450	Computational Mechanics II	3
MMAE 452	Aerospace Propulsion	3
Total Hours		**15**

Semester 7		Credits
MMAE 410	Aircraft Flight Mechanics	3
MMAE 411	Spacecraft Dynamics	3
MMAE 412	Spacecraft Design I*	
OR		3
MMAE 414	Aircraft Design I*	
IPRO 497	Interprofessional Project I	3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 8		Credits
MMAE 413	Spacecraft Design II*	
OR		3
MMAE 416	Aircraft Design II*	
MMAE 415	Aerospace Laboratory II	4
IPRO 497	Interprofessional Project II	3
Aerospace Elective**		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**16**

Total Credit Hours **127**

* Students must choose either the MMAE 412 and MMAE 413 sequence or the MMAE 414 and MMAE 416 sequence.

** Students must choose either MMAE 417, MMAE 418, or MMAE 472.

Institute of Psychology

Institute Web site: www.iit.edu/psych

Psychology's objective is to understand the manner in which organizations, human beings, and animals behave, learn, and interact, as well as the ways in which their behavior can be modified. The Institute's curriculum encompasses the past 25 years' worth of major changes in psychology and prepares students for modern careers in psychology or other allied professions.

The Institute offers a distinct undergraduate program that draws upon the strengths of highly successful graduate programs in clinical, industrial/organizational, and rehabilitation psychology. Designed for highly motivated, career-oriented students, this program emphasizes the integration of applied research with faculty, practical experience in professional settings, and traditional classroom activities. It is characterized by faculty mentorship, individual advising, and group activities with faculty, graduate students, and other undergraduate students.

The curriculum is customizable and supports students with diverse career goals. Students who have interest in such areas as sports counseling, child care, disability, or human resources can include preliminary preparation for those professions in their studies. To assist students in developing a more coherent path, the Institute offers three specialty tracks from which to choose. These are: Culture, Conflict and International Relations; Psychology of Emerging Technologies; The Human Environment.

The objectives of the Bachelor of Science degree program in psychology are:

- To prepare students for baccalaureate level careers that draw on an understanding of human behavior
- To provide a basic understanding of research methods in the behavioral sciences
- To incorporate the recommendations of the American Psychological Association for undergraduate education in the four basic areas of social differences, individual differences, physiology, and learning and cognition
- To prepare students for graduate training in psychology

Most psychologists hold advanced degrees and the program offers excellent preparation for graduate school. A bachelor's degree in psychology offers diverse options, including those in the burgeoning areas of geriatrics, health and sports counseling, behavioral medicine, and managed health care, as well as traditional settings such as schools, courts, hospitals, industries and research laboratories. Many students will find psychology highly beneficial as a pre-professional major for advanced studies in medicine, dentistry, law, business, or public administration.

Faculty

Dean
M. Ellen Mitchell
Room 252 Life Sciences
312.567.3500

Professors
Ayman, Corrigan, Lam, Mitchell, Schleser, Sher, Young

Associate Professors
Hopkins, Morris

Assistant Professors
Bach, Ben-Zeev, Cigularov, Ditchman, Ellington, Gordon, Lane, Larson, Lee, Mead

Visiting Associate Professor
Stanard

Faculty Emeriti
Geist, Huyck, Wolach

Bachelor of Science in Psychology

Required Courses	Credit Hours
Psychology Requirements PSYC 100, 101, 204, 221, 222, 301, 303, 310, 406, 409, 423, 435 or 436	34
Mathematics Requirements PSYC 203, MATH 119 & 122 OR MATH 148 & 149 OR MATH 151	8-12
Computer Science Requirement CS 105	2
Natural Sciences Requirements* BIOL 107, 109, 115, PHYS 211, and a Natural Science Elective	11-13
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Interprofessional Projects	6
Psychology Capstone Project PSYC 485**	3
Free Electives	35-45
Total Hours	**126-130**

* To meet the recommended Natural Science requirement, students must take two courses from one discipline, and one from a different discipline. A Biology course with a lab is required as well as an additional natural science elective.

** Option is available to take a 2 semester Psychology Capstone Project (PSYC 485 and PSYC 486) for 6 credit hours.

Psychology Curriculum

Semester 1		Credits
PSYC 100	Introduction to the Profession I	2
PSYC 221	Human Behavior, Growth and Learning	3
BIOL 107	General Biology Lectures*	3
BIOL 109	General Biology Laboratory*	1
Math Sequence Elective**		3
Humanities 100-level Elective		3
Total Hours		**15**

Semester 2		Credits
PSYC 101	Introduction to the Profession II	2
PSYC 222	Brain, Mind and Behavior	3
BIOL 115	Human Biology*	3
Math Sequence Elective**		3
Humanities or Social Sciences Elective		3
Free Elective		3
Total Hours		**17**

Semester 3		Credits
PSYC 203	Undergrad Stats for Behavioral Sciences†	3
PSYC 301	Industrial Psychology	
OR		3
PSYC 310	Social Psychology	
Humanities or Social Sciences Elective		3
Free Elective		3
Free Elective		3
Free Elective		3
Total Hours		**18**

Semester 4		Credits
PSYC 204	Research Methods	3
PSYC 303	Abnormal Psychology	3
PHYS 211	Basic Physics I*	3
CS 105	Intro to Computer Programming I	2
Free Elective		3
Free Elective		3
Total Hours		**17**

Semester 5		Credits
PSYC 310	Social Psychology	
OR		3
PSYC 301	Industrial Psychology	
PSYC 409	Psychological Testing	
OR		3
PSYC 423	Learning Theory	
IPRO 497	Interprofessional Project I	3
Free Elective		3
Humanities or Social Sciences Elective (300+)		3
Total Hours		**15**

Semester 6		Credits
PSYC 435	Early Development	
OR		3
PSYC 436	Adult Development	
Humanities or Social Sciences Elective (300+)		3
Humanities or Social Sciences Elective (300+)		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Semester 7		Credits
PSYC 423	Learning Theory	
OR		3
PSYC 409	Psychological Testing	
IPRO 497	Interprofessional Project II	3
Natural Science Elective*		3
Free Elective		3
Free Elective		
OR		3
PSYC 485	Senior Capstone Project I†††	
Total Hours		**15**

Semester 8		Credits
PSYC 406	History and Systems of Psychology††	3
PSYC 485	Senior Capstone Project I	
OR		3
PSYC 486	Senior Capstone Project II†††	
Humanities or Social Sciences Elective (300+)		3
Free Elective		3
Free Elective		3
Total Hours		**15**

Total Credit Hours **127**

* To meet the recommended Natural Science requirement, students must take two courses from one discipline, and one from a different discipline. A Biology course with lab is required as well as an additional natural science elective.

** Choose from MATH 119 & 122, MATH 148 & 149, or MATH 151 according to Math Placement exams.

† Must take psychology statistics, not business statistics.

†† Must be 4th year/senior to enroll.

††† Option is available to take a 2 semester Psychology Capstone Project.

Specialty Tracks

In order to assist students in developing a sound career path, the Institute of Psychology offers the undergraduate psychology degree with optional specialty tracks. The selection of a track is not a degree requirement, but it is encouraged. These tracks are distinct from a minor by virtue of their cross disciplinary and in-depth nature. Some students may elect to pursue a double major or a minor which would not be precluded by these specialty tracks. A specialty consists of 15 credit hours from courses in the track in which at least two of the classes are higher than the 200-level. Students take these classes as electives and they are expected to incorporated the specialty content area into their final capstone project. The courses for these tracks are listed online at **www.iit.edu/psych** and may be obtained from advisors.

Culture, Conflict, and International Relations

Today's world is characterized by diversity that contributes to richness of culture and also to tensions associated with those differences. The global economy and the reach of information systems transcend political and national boundaries. Students who select this track will be prepared for careers that draw on strengths in human relations, cross cultural knowledge and negotiation.

Psychology of Emerging Technologies

This specialty track focuses on the human dimension of technological development. Just as advances in computer science have lead to changes in relationships, business communication, and accessibility, emerging technologies such as artificial intelligence, nanotechnology, and genetic engineering will produce equally broad social changes in the future. The students who complete this track may wish to pursue careers in law, sociology, genetic counseling, humanities, public policy, or journalism.

The Human Environment

Architecture influences many aspects of human life including work, leisure activities, family life, and ultimately social interaction. Public spaces and multi-use buildings represent current areas of particular interest to architects whose attention is increasingly on sustainability. The built environment must now, more than ever before, include consideration of human needs, behavioral patters, social concerns, resources both natural and economic, environmental consciousness, and planning for the future. Students who complete this track may wish to pursue careers in architecture, city planning, urban development, resource management, business, conservation, human factors, or consulting psychology.

Optional Programs

Accelerated Combined-Degree Programs

Today, an undergraduate degree doesn't necessarily guarantee a job in the workforce or provide long-term career security. However, the Institute of Psychology offers combined, accelerated undergraduate and graduate programs that help minimize both concerns. 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.), business (B.S./M.B.A.), public administration (B.S./M.P.A.), rehabilitation counseling (B.S./M.S.) or personnel and human resources development (B.S./M.S.) offered by IIT. Students wishing to participate in these options must indicate this as early as possible. With the consent of the Institute of Psychology dean, undergraduate psychology students may enroll in some graduate-level psychology courses. Close communication with advisors 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.

For undergraduate psychology majors, it is possible to earn a Masters of Science in Rehabilitation Counseling or a Masters of Science in Personnel and Human Resources Development (PHRD) in one-and-a-half years instead of the normal two years. By taking psychology courses that apply to the Rehabilitation Counseling or PHRD program, graduate program coursework can be reduced by up to 15 credit hours, or one full-time semester.

BS/MS Rehabilitation

The mission of the Rehabilitation Counseling Education Program at IIT is to prepare students to assume vital roles as counselors fully qualified to help in the vocational, educational and personal adjustment of people with physical, mental, and emotional disabilities.

Since its inception, the Rehabilitation Services Administration (RSA) of the U.S. Department of Education has continuously funded IIT's Rehabilitation Counselor Education programs. The RSA scholarships are designed to increase the number of practicing rehabilitation counselors by providing scholarships and stipend money to cover the cost of student tuition and books. The Council of Rehabilitation Education (CORE) has accredited the graduate program since 1975 and the CORE Commission on Undergraduate Education has registered the undergraduate program in Rehabilitation Services since 2006. IIT rehabilitation graduates are eligible to become nationally certified rehabilitation counselors and licensed professional counselors in Illinois.

U.S. News & World Report ranked the Rehabilitation Counseling Program in the top 15 in the nation.

Current Research Projects

- Assessment of readiness for change and treatment matching
- Psychosocial adjustment to disability and chronic illness
- Traumatic brain injury rehabilitation and neuropsychological assessment
- Disability and health
- Technology applied to human behavior and rehabilitation

Rehabilitation Counseling Courses

Students in the accelerated program may take the following courses as part of required or elective courses for the B.S. in Psychology. If taken as an undergraduate student, the courses listed below do not have to be repeated for the graduate Rehabilitation Counseling program. A grade of B or better is required for courses to be used toward a graduate degree.

PSYC 410	Vocational Rehabilitation
PSYC 411	Medical Aspects of Disabling Conditions
PSYC 412	Multicultural and Psychosocial Aspects of Disability
PSYC 513	Assessment in Rehabilitation Counseling
PSYC 523	Introduction to Theories of Psychotherapy
PSYC 557	Pre-Practicum in Rehabilitation Counseling
PSYC 562	Job Placement
PSYC 563	Human Growth and Career Development
PSYC 583	Rehabilitation Engineering Technology I
PSYC 590	Psychiatric Rehabilitation

BS/MS Personnel and Human Resources Development

The Personnel and Human Resources Development Master's Program is for individuals interested in careers in highly dynamic environments such as management consulting, human resources management, industrial relations, and consumer behavior.

Housed within the Industrial/Organizational Psychology Program, the Personnel and Human Resources Development program is based on a scientist/practitioner model and the guidelines of the Society for Industrial and Organizational Psychology, Division 14, of the American Psychology Association.

The most recent Princeton Review's ***The Gourman Report of Graduate Programs*** ranked the IIT Industrial/Organizational Psychology program **thirteenth** in the nation.

Current Research Projects

- Women in the Workplace
- Leadership
- Training
- Organizational Effectiveness
- Employee Selection
- Customer Service Climate
- Safety in the Workplace

Personnel and Human Resources Development Courses

Students in the accelerated program may take the following courses as part of required or elective courses for the B.S. in Psychology. If taken as an undergraduate student, the courses listed below do not have to be repeated for the graduate Personnel and Human Resources Development programs. A grade of B or better is required for courses to be used toward a graduate degree.

PSYC 556	Organizational Psychology
PSYC 502	Social Bases of Behavior
PSYC 545	Graduate Statistics I
PSYC 546	Graduate Statistics II
PSYC 503	Learning, Cognition, and Motivation

IIT/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 IIT. 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 degree in Psychology from IIT.

Eligibility for the program

Students applying to the program must have a cumulative grade point average of at least 3.0 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 IIT, 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 IIT and COD. Applicants must also complete the application process at both COD and IIT in order to be admitted to both institutions. The IIT application may be submitted only for a bachelor's program in Psychology. Admission to other IIT 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 IIT Office of Educational Services each semester for each student attending COD and enrolled in the DAP. IIT 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 IIT Undergraduate Bulletin in effect at the time of admission into the DAP for the Baccalaureate Degree.

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 IIT.

Certificate in Industrial Training

This certificate is designed to help either the experienced skilled worker or a technically educated person to learn methods of knowledge delivery in industrial training settings.

Admission Requirements

Qualified participants must be high school graduates and meet the minimum admission requirements for enrollment at IIT. Students should either have multiple years of work experience or have junior or higher status in a four-year program at IIT. Some basic psychology background would be helpful to the student, but this is not a requirement.

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.

PSYC 301	Industrial Psychology
PSYC 455	Development of Evaluation of Training in Organizations
PSYC 489	Undergraduate Psychology Seminar

Minors

Minors consist of at least five courses (minimum 15 semester 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 advisors in their respective major departments.

Minors offered through the Institute of Psychology are:

Human Resources

PSYC 221	Human Behavior, Growth and Learning
PSYC 301	Industrial Psychology
PSYC 310	Social Psychology
PSYC 409	Psychological Testing
PSYC 455	Development and Evaluation of Training Organizations
PSYC 481	Group & Leadership at Work

Organizational Psychology

PSYC 221	Human Behavior, Growth and Learning
PSYC 301	Industrial Psychology
PSYC 303	Abnormal Psychology
PSYC 310	Social Psychology
PSYC 409	Psychological Testing

Psychology

At least 15 credit hours must be completed, including the following two required courses:

PSYC 203	Undergraduate Statistics for the Behavioral Sciences
PSYC 221	Human Behavior, Growth and Learning

Rehabilitation Services

PSYC 410	Vocational Rehabilitation
PSYC 411	Medical Aspects of Disabling Conditions
PSYC 412	Multicultural and Psychosocial Aspects of Disability
PSYC 583	Rehabilitation Engineering Technology
PSYC 590	Psychiatric Rehabilitation

ROTC: Air Force Aerospace Studies

Department Web site: www.iit.edu/departments/airforce

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 degrees. Most graduates who enter the Air Force through this program are assigned to positions consistent with their academic majors. Highly qualified, interested graduates may compete for selection as pilots or navigators.

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

Chair
Lt. Col. Addison P. Tower
208 Stuart Building
312.567.3526

Professor
Tower

Assistant Professors
Briones, Boland, Hunt

Financial Aid

The Air Force ROTC College Scholarship Program (CSP) offers four- 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, **www.afrotc.com** or may contact Detachment 195 at 312-567-3525.

Courses

The General Military Course (AS 101, 102, 201, 202) examines the role of U.S. military forces in the contemporary world, with particular attention to the United States Air Force and its organization and mission.

The Professional Officer Course (AS 301, 302, 401, 402) provides an examination of the broad range of U.S. civil-military relations, the environmental context in which U.S. defense policy is formulated and implemented, and the principles and practices of leadership as they relate to the U.S. Air Force.

Leadership Laboratory is mandatory for each course and complements the program by providing fellowship and leadership experiences.

A student may take any course without entering the AFROTC program.

Minors

Students may select a minor in Air Force aerospace studies. For course requirements, see pages 158–162.

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 four-week 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. Not meeting this requirement does not prevent students from enrolling in the AS 300 course, but rather postpones award of POC privileges and pay until field training is accomplished. The major areas of study during field training include junior officer training, career orientation, base functions, and the Air Force environment.

Two-Year Program

This program is designed for undergraduate and graduate students in qualified majors with fewer than three, but at least two, years of coursework remaining towards their degree. Completion of this program requires a five-week summer field training encampment and the two-year POC. The five-week field training session is normally and preferably the summer prior to the start of the senior year (or first semester of the POC), but may be completed the following summer. Not meeting this requirement does not prevent students from enrolling in the AS 300 course, but rather postpones award of POC privileges and pay until field training is accomplished. The major areas of study for the five-week encampment are the same as the four-week encampment with the addition of the GMC curriculum. Interested students should contact the Air Force ROTC Detachment 195 at 312-567-3525 as soon as possible during the fall term of their sophomore year.

ROTC Air Force Aerospace Studies Curriculum

Note: Leadership Laboratory is mandatory for each course.

Semester 1		Credits
AS 101	The Foundations of the USAF I*	1
Total Hours		**1**

Semester 2		Credits
AS 102	The Foundations of the USAF I*	1
Total Hours		**1**

Semester 3		Credits
AS 201	The Evolution of USAF Air and Space Power I*	1
Total Hours		**1**

Semester 4		Credits
AS 202	The Evolution of USAF Air and Space Power II*	1
Total Hours		**1**

Semester 5		Credits
AS 301	Air Force Leadership Studies I	3
Total Hours		**3**

Semester 6		Credits
AS 302	Air Force Leadership Studies II	3
Total Hours		**3**

Semester 7		Credits
AS 401	National Security Affairs	3
Total Hours		**3**

Semester 8		Credits
AS 402	Preparation for Active Duty	3
Total Hours		**3**

Total Credit Hours **16**

* GMC courses AS 101, 102, 201 and 202 academic curricula are included in the two-year program's five-week field training.

ROTC: Military Science

Department Web site: www.iit.edu/departments/army

The principal objective of the college-level Reserve Officer's 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 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 two-year Advanced Course is open to students eligible for advanced placement through a variety of options. Both programs include attendance at Camp Adventure (a six-week advanced summer camp) just prior to commissioning.

Faculty

Chair
LTC Jeffrey C. Collins
University of Illinois at Chicago
312.413.9422

IIT Program Director
CSM Mark Bowman
402 FA
312.808.7140

Professor
Collins

Assistant Professor
Bowman

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 Camp Challenge may be substituted for the Basic Course.

Leadership Development Assessment Course (LDAC)

All cadets who successfully complete the Basic Course, meet the physical and academic requirements, and pass an officer-qualification test and a physical examination are eligible for selection by the professor of military science for the Leadership Development Assessment Course (LDAC). A tax-free subsistence allowance of $450-$500 per month is paid to each cadet in this advanced course except during attendance at summer camp, when pay is approximately $200 per week. Upon graduation and successful completion of the LDAC and the Professional Military Education Requirements (PMEs), cadets are commissioned as second lieutenants in the Active Army, the Army Reserve or the National Guard.

Leadership Training Course (LTC)

Cadets are paid approximately $800 during this courses. Travel to and from this course is at government expense. Meals, housing, medical care, uniforms, and equipment are furnished.

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 $450-$500 as an advance-course cadet, the program offers two-, three- and four-year federal Army ROTC scholarships for full tuition to qualified students. IIT offers an excellent incentive package to scholarship winners. For further information, students should call 312-808-7140 or visit the Department of Military Science in 402 Farr Hall.

ROTC: Military Science Curriculum

Semester 1		Credits
MILS 101	Foundations of Officership	1
MILS 147	Aerobic Conditioning*	2
Total Hours		**3**

Semester 2		Credits
MILS 102	Basic Leadership	1
MILS 148	Aerobic Conditioning*	2
Total Hours		**3**

Semester 3		Credits
MILS 201	Individual Leadership Studies	2
MILS 247	Aerobic Conditioning*	2
Total Hours		**4**

Semester 4		Credits
MILS 202	Leadership and Teamwork	2
MILS 248	Aerobic Conditioning*	2
Total Hours		**4**

Semester 5		Credits
MILS 301	Leadership and Problem Solving	3
MILS 347	Aerobic Conditioning**	2
Total Hours		**5**

Semester 6		Credits
MILS 302	Leadership and Ethics	3
MILS 348	Aerobic Conditioning**	2
Total Hours		**5**

Semester 7		Credits
MILS 401	Leadership and Management	3
MILS 447	Aerobic Conditioning**	2
Total Hours		**5**

Semester 8		Credits
MILS 402	Officership	3
MILS 448	Aerobic Conditioning**	2
Total Hours		**5**

Total Credit Hours **34**

* MILS 147, 148, 247 and 248 (Aerobic Conditioning) are required for all scholarship cadets in the Basic Program.

** MILS 347, 348, 447 and 448 (Aerobic Conditioning) are required for all Advanced Course cadets.

ROTC: Naval Science

Department Web site: www.iit.edu/nrotc

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 engineering aboard a nuclear or conventionally powered ship. The theoretical knowledge obtained at IIT 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

Chair
CAPT Edward Martin, USN
215 Stuart Building
312.567.3527

Professor
Martin

Associate Professor
Lesh

Assistant Professors
Clark, Larsen, Maldonado, Saluke

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.

The unit is located at:

10 W. 31st St.
Rm 215
Chicago, IL 60616.

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 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 five years of active duty service for Navy and four years of active duty for the Marine Corps.

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. Naval science courses are not offered on a pass-fail basis.

Optional Program

Students may select a minor in naval science. Course requirements are shown on the next page.

ROTC: Naval Science Curriculum*

Semester 1		Credits
NS 101	Introduction to Naval Science	2
Total Hours		**2**

Semester 2		Credits
NS 202	Seapower and Maritime Affairs	3
Total Hours		**3**

Semester 3		Credits
NS 401	Leadership and Management	3
Total Hours		**3**

Semester 4		Credits
NS 301	Navigation	3
Total Hours		**3**

Semester 5		Credits
NS 102	Naval Ships Systems I (Engineering)	3
Total Hours		**3**

Semester 6		Credits
NS 201	Naval Ships Systems II (Weapons)	3
Total Hours		**3**

Semester 7		Credits
NS 302	Naval Operations and Seamanship	3
Total Hours		**3**

Semester 8		Credits
NS 402	Naval Leadership and Ethics	3
Total Hours		**3**

Total Credit Hours **23**

Marine Option*

Semester 1		Credits
NS 101	Introduction to Naval Science	2
Total Hours		**2**

Semester 2		Credits
NS 202	Seapower and Maritime Affairs	3
Total Hours		**3**

Semester 3		Credits
NS 401	Leadership and Management	3
Total Hours		**3**

Semester 4		Credits
Total Hours		**0**

Semester 5		Credits
NS 310	Evolution of Warfare	3
Total Hours		**3**

Semester 6		Credits
NS 410	History of Amphibious Warfare	3
Total Hours		**3**

Semester 7		Credits
Total Hours		**0**

Semester 8		Credits
NS 402	Naval Leadership and Ethics	3
Total Hours		**3**

Total Credit Hours **17**

* NS 497: Naval Science Laboratory (0 credits) is required every semester.

Social Sciences

Department Web site: www.iit.edu/csl/socs

The Department of Social Sciences encompasses the disciplines of political science, sociology, and anthropology. The department offers coursework and awards degrees at the undergraduate level. Our faculty concentrates on a variety of subjects using an interdisciplinary approach, including: American and comparative politics; policy analysis; science, technology, and environment; urban affairs; international migration; and sociology of architecture and design.

An undergraduate program is offered leading to a Bachelor of Science in Political Science, as well as minors in political science, sociology, and public administration. The department participates with other IIT departments in offering interdisciplinary minors in philosophy and sociology of science, law and society, technology and human affairs, and urban affairs.

A combined degree is offered with the Stuart School of Business master's degree in public administration (M.P.A.). The B.S./M.P.A. can usually be completed in five years. The department cooperates with the university's law school (Chicago-Kent College of Law) in offering a program leading to a bachelor's degree and law degree in six years instead of the usual seven years.

The educational objectives of the degree program in Political Science are to provide students with knowledge of the central concepts and theories in political science and a set of practical skills preparing the student for success in the public, non-profit, or private sectors; graduate school; or law school.

The curriculum is designed to develop the skills necessary to identify and formulate policy and to conduct the analysis necessary to devise solutions. Specific skills emphasized include written and oral communication, modeling, and statistical and other forms of analysis. Students majoring in political science focus their study on American and comparative politics, urban affairs, science and technology policy, or interdisciplinary approaches.

Basic courses in the social sciences have the objective of providing both majors and non-majors with an understanding of local and global issues. Specialized courses in the policy areas have the objective of offering both majors and non-majors the opportunity to pursue a variety of social science subjects at advanced levels.

Faculty

Interim Chair
Christena Nippert-Eng
Room 116 Siegel Hall
312.567.6812

Professors
Grimshaw, Ireland, Segerstrale

Associate Professor
Nippert-Eng

Assistant Professors
Bliss, Hosman, Shapiro

Visiting Assistant Professor
Schalliol

Faculty Emeriti
Beam, DeForest

Political Science

Political science emphasizes making connections between the theory and practice of politics. Concerns range from perennial philosophical issues regarding justice, equality, and freedom to practical political matters such as conflict resolution, collective decision making, and public policy. Opportunities are provided to consider how theoretical understandings of politics can inform political action and how participation in politics offers the basis for understanding it.

Since the ancient Greeks, knowledge of the affairs of state has always been deemed essential for all educated citizens. A knowledge of political science is central to any occupation or profession that requires an understanding of human behavior and the relations between people and governments or the analysis and communication of information about public problems. A background in political science is virtually indispensable to people in politics and government, whether at the global, national, state, or local level.

A political science undergraduate degree is common for the following types of professionals: lawyers, journalists, policy analysts, planners, scientists, business managers, politicians, and medical personnel. Such professionals are in constant need of information on and understanding of the political, legal, governmental, and social implications of their fields.

Students seeking a major in political science are required to complete 33 credits in political science. Majors are also required to complete an approved course in statistics and a course in research methods and may also be compelled to take a course necessitating completion of a research paper. Students seeking a minor in political science must complete 15 credits in political science. Additional courses may be required to prepare students for professional training and for entrance into their chosen professional field, such as law or medicine.

The political science curriculum consists of 126 semester hours, which are distributed as follows: at least 33 hours in political science (including 5 required core courses); a minor of at least 15 hours; up to 29 hours of free electives; and completion of the general education program (three hours of Introduction to the Profession; six hours of Interprofessional Projects; five hours of mathematics, including PSYC 203; two hours of computer science; 21 hours of humanities and social sciences; and 11 hours of natural science or engineering). Students should consult their academic advisor regarding course sequences.

Sociology

Sociology may be defined as the study of societies, communities, organizations, and groups. It examines the structure and process of society and of the social groups that compose it. The focus is often on how people coordinate their activities to reach individual and collective goals in a wide range of settings, including workplace, educational, religious, familial, and political settings.

Sociological analysis explores social situations from the standpoint of the roles, meanings, and norms that make behavior predictable and organized. It investigates how such patterns of independent activity arise and are sustained; why they take one shape instead of another; how some change more rapidly than others; how they are related to each other; and how people justify and explain their organizations and activities. Thus the field provides an understanding of the crucial problems facing our rapidly changing society.

Sociology provides intellectual and research skills, as well as a body of concepts and information useful to those entering numerous professions, including architecture, engineering, design, government, urban planning, social work, law, and medicine. Students completing a minor in sociology are required to take five three-hour courses in the discipline.

Bachelor of Science in Political Science

Required Courses	Credit Hours
Mathematics Requirements Two courses of MATH 119 or above including PSYC 203 or BUS 221	6
Humanities and Social Sciences Requirements For general education requirements, see page 25.	21
Natural Sciences Requirements For general education requirements, see page 25.	11
Computer Science Requirement CS 105	2
Political Science Requirements PS 100*, PS 200, PS/SOC 209, PS 273 or PS/SOC 210, PS 230 or PS 232	15
Political Science Specialization Students may select only one specialization.	21
Required Minor Electives	15
Free Electives	29
Interprofessional Projects	6
Total Hours	**126**

* Students may substitute SOC 200, or SOC 203.

Political Science Curriculum

Semester 1		Credits
PS 100	Introduction to the Profession*	3
PS 200	American Government	3
Humanities 100-level Elective		3
Math Elective above MATH 119		3
Natural Science or Engineering Elective		4
Total Hours		**16**

Semester 2		Credits
CS 105	Intro to Computer Programming I	2
PS 230	International Relations	
OR		3
PS 232	Introduction to Comparative Politics	
Natural Science or Engineering Elective		4
Humanities or Social Science Elective		3
Social Science Elective		3
Free Elective		3
Total Hours		**18**

Semester 3		Credits
PSYC 203	Undergrad Stats for Behavioral Sciences	3
Political Science Specialization		3
Political Science Specialization		3
Humanities Elective (300+)		3
Social Science Elective (300+)		3
Total Hours		**15**

Semester 4		Credits
IPRO 497	Interprofessional Project	3
PS 209	Research Methods	3
Minor Course Elective		3
Political Science Specialization		3
Natural Science or Engineering Elective		3
Total Hours		**15**

Semester 5		Credits
PS 273	Great Political Thinkers	
OR		3
PS 210	Social & Political Thought	
Minor Course Elective		3
Political Science Specialization		3
Social Science Elective (300+)		3
Free Elective		2
Free Elective		3
Total Hours		**17**

Semester 6	Credits
Minor Course Elective	3
Political Science Specialization	3
Humanities Elective (300+)	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Semester 7		Credits
IPRO 497	Interprofessional Project	3
Minor Course Elective		3
Free Elective		3
Free Elective		3
Political Science Specialization		3
Total Hours		**15**

Semester 8	Credits
Minor Course Elective	3
Political Science Specialization	3
Free Elective	3
Free Elective	3
Free Elective	3
Total Hours	**15**

Total Credit Hours **126**

* Students may substitute SOC 200, or SOC 203.

Social Sciences Specializations

Some courses fit within more than one specialization.

Specialization in Urban Affairs

Students must take the following courses:

PS 315	Urban Politics
PS/SOC 403	Issues in Urban Affairs

Four courses must also be chosen from the following:

PS 314	Intergovernmental Relations and Federalism
PS 317	Chicago Politics
PS 341	School Politics
PS 351	Public Administration
PS 420	Comparative Urban Politics
PS/SOC 320	Urban Institutions
PS/SOC 354	Urban Policy
SOC 311	Social Use of Space
SOC 342	Industrial Society
SOC 348	Deviant Behavior and Conformity
SOC 350	Urban Sociology
SOC 352	Sociology of Education

Specialization in Policy Analysis/Technology

Students must take the following courses:

PS 306	Politics and Public Policy
PS 408	Methods of Policy Analysis

Four courses must also be chosen from the following:

PS 312	Analysis and Evaluation of Public Policy
PS 313	Comparing Public Policy
PS 319	Comparative Health Systems
PS 329	Politics of Global Warming
PS 332	Politics of Science and Technology
PS 333	Politics of National Security
PS 335	Issues in U.S. Space Policy
PS 338	Energy and Environmental Policy
PS 360	Globalization: Global Political Economy
PS 438	Energy and Environmental Policy
PS 440	Issues in Globalization
PS 453	U.S. Regulatory Politics and Policy
PS 465	Political Economy
PS/SOC 353	Promise and Problems of Policy
PS/SOC 354	Urban Policy
PS/SOC 362	Technology and Social Change
SOC 356	Transformative Technologies

Specialization in American and Comparative Politics

Students must take the following courses:

PS 306	Politics and Public Policy
PS 462	Issues in American Politics (Seminar)

Four courses must also be chosen from the following:

PS 232	Introduction to Comparative Politics
PS 303	Politics and Media
PS 313	Comparing Public Policy
PS 314	Intergovernmental Relations and Federalism
PS 316	Political Parties and Election Process
PS 318	Contemporary Constitutional Issues
PS 323	Problems of Multi-Ethnic and Religious States
PS 328	Vietnam War
PS 333	Politics of National Security
PS 335	Issues in U.S. Space Policy
PS 345	American Presidency
PS 351	Public Administration
PS 356	Law in American Society
PS 365	Introduction to Legal Analysis
PS 372	Politics of Africa
PS 373	Politics of East Asia
PS 374	Politics of Europe
PS 375	Politics of Latin America
PS 376	Politics of Migration
PS 420	Comparative Urban Politics
PS 453	U.S Regulatory Politics and Policy
PS/SOC 321	Social Inequality

Specialization in Society, Politics, and Values

Students must take the following courses:

SOC 301	The Social Dimension of Science
PS/SOC 495	Power, Domination, and Resistance

Four courses must also be chosen from the following:

PS 273	Great Political Thinkers
PS 401	Terrorism, Security, and Civil Liberties
PS/SOC 210	Social and Political Thought
PS/SOC 321	Social Inequality
PS/SOC 340	Social Organization and Control
PS/SOC 361	Theories of Capitalism
PS/SOC 362	Technology and Social Change
PS/SOC 480	Modeling Complexity
SOC 203	Further Explorations of Sociological Concepts
SOC 212	Contemporary Social Problems
SOC 302	Science and Beliefs
SOC 348	Deviant Behavior and Conformity
SOC 351	Sociology of Work
SOC 356	Transformative Technologies
SOC 359	Humans, Ecology, and the Environment
SOC 422	Complex Organizations
SOC 425	Privacy
SOC 431	Development of Sociological Thought
SOC 442	Race and Ethnicity in International Perspective
SOC 454	Gender and Work Through Film: Ethnography

Specialization in Interdisciplinary Approaches to Science and Technology Studies

Students must take the following courses:

SOC 200 Introduction to Sociology
OR
SOC 203 Engaging Sociology

PS 100 Introduction to the Profession
OR
PS 306 Politics and Public Policy

PS/SOC 209	Research Methods
PS 360	Globalization: Global Political Economy
SOC 362	Technology and Social Change

Students must also take two of the following courses:

SOC 303	Science in Sociology
PS 332	Politics of Science and Technology
ANTH 300	Anthropology of Technology

Finally, students must choose four additional courses from one of the following clusters:

Public Policy

PS 312	Analysis and Evaluation of Public Policy
PS 313	Comparing Public Policy
PS 319	Comparative Health Systems
PS 332	Politics of Science and Technology
PS 335	Issues in U.S. Space Policy
PS 338	Energy and Environmental Policy
PS 465	Political Economy
PS/SOC 353	Promise and Problems of Policy

Sociology

SOC 203	Engaging Sociology: Further Explorations of Sociological Concepts
SOC 301	Social Dimension of Science
SOC 303	Science in Society
SOC 312	Contemporary Social Problems
SOC 321	Social Inequality
SOC 348	Deviant Behavior and Conformity
SOC 356	Transformative Technologies
SOC 359	Humans, Ecology, and the Environment

Work and Labor Markets

PSYC 301	Industrial Psychology
PS/SOC 340	Social Organization and Control
SOC 342	Industrial Society
SOC 351	Sociology of Work
SOC 371	Occupations and Professions
SOC 425	Privacy
SOC 454	Gender and Work through Film: Ethnography

Customized Specialization

Students must take six courses in Political Science or Sociology at the 300- and 400-level chosen in consultation with advisor and including at least one seminar. A detailed, coherent plan of study must be filed and approved by the department.

Minors and Special Programs

Minors

Minors consist of at least five courses (minimum 15 semester 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 advisors in their respective major departments. Courses used to satisfy general education or major requirements do not apply to a minor. Exceptions may be made in individual cases.

NOTE:
Not all minors are applicable to all majors.

Following are approved minors:

Aerospace Science (ME & MSE majors only)

- Mechanical Engineering Majors:
  MMAE 311, MMAE 312, MMAE 452, one course from each of the following group of courses: (MMAE 410, MMAE 411, MMAE 441) and (MMAE 412, MMAE 414, MMAE 436, MMAE 437).
- Materials Science Engineering Majors:
  MMAE 304, MMAE 310 or MMAE 313, MMAE 311, MMAE 312, and one of the following courses: MMAE 350, MMAE 410 or MMAE 411 or MMAE 441, MMAE 443, MMAE 452.

Air Force Aerospace Studies
AS 101, AS 102, AS 201, AS 202, AS 301, AS 302, AS 401, AS 402. Attendance at a five-week field training camp may be substituted for AS 101, AS 102, AS 201, and AS 202.

Applied Mathematics
MATH 230, MATH 252, MATH 332, and at least two courses in mathematics at the 400-level.

Applied Mechanics (AE & MSE majors only)

- Aerospace Engineering Majors:
  MMAE 432 or MMAE 433, and four of the following courses: MMAE 321, MMAE 322 or MMAE 323, MMAE 302 or MMAE 306 or MMAE 332, MMAE 445, MMAE 485.
- Materials Science Engineering Majors:
  MMAE 302 or MMAE 306 or MMAE 332, MMAE 310 or MMAE 313, MMAE 322 or MMAE 323, MMAE 350, MMAE 432 or MMAE 445

Architecture (non-architecture majors only)
This minor consists of 15 semester hours. ARCH 100, ARCH 109, ARCH 113, either AAH 119 or AAH 120, and one of the following courses: ARCH 114, ARCH 125, ARCH 321, ARCH 403, and ARCH 413. Those students preparing for competitive application to graduate programs in architecture are encouraged to select ARCH 114.

Artificial Intelligence
CS 201, CS 330, CS 331, CS 430, CS 480.

Biochemistry
BIOL 214, BIOL 401, BIOL 402, BIOL 404, BIOL 445.

Biology
BIOL 107, BIOL 115, BIOL 214, BIOL 445, and one of the following: BIOL 210, BIOL 305, BIOL 327, BIOL 401, BIOL 402, BIOL 404, BIOL 410, BIOL 426, BIOL 430, BIOL 446, or an approved Biology elective at the 500-level.

Building Systems Engineering
CAE 331, CAE 334, CAE 461, CAE 464, and one of the following courses: CAE 403, CAE 409, CAE 425, CAE 463, CAE 465, CAE 466, CAE 467

Business
BUS 210 or (BUS 211 and BUS 212), ECON 211 or (ECON 151 and ECON 152), BUS 301 and two of the following three courses: ECON 423, BUS 371, or BUS 305. Chemical engineering majors should also take CHE 426 or another engineering science course.

Chemistry
At least 15 credit hours must be completed from the following courses: CHEM 247; one of the sequences: (CHEM 237 and CHEM 239) or (CHEM 343 and CHEM 344); and electives chosen from 300- and 400-level chemistry courses.

Circuits and Systems
(non-EE, non-CPE majors only)
ECE 211, ECE 213, ECE 218, and one of the following sequences: (ECE 308 and ECE 403), (ECE 308 and ECE 438), or (ECE 319 and ECE 420).

Communication
15 credit hours of communication coursework, at least nine of which must be at or above the 300-level, chosen in consultation with the minor advisor.

Computational Structures
CS 201, CS 330, CS 331, CS 430, MATH 350.

Computer Architecture
CS 201, ECE 218, CS 331, CS 350, CS 470.

Computer Networking
CS 201, CS 331, CS 350, CS 450, CS 455.

Construction Management
CAE 470, CAE 471, CAE 472, CAE 473, ECON 423.

Database Management
CS 201, CS 331, CS 425, CS 445 and one of the following courses: CS 422 or CS 429.

Electromechanical Design and Manufacturing (AE and ME majors only)

- Aerospace Engineering majors:
  MMAE 445, MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces PHYS 300).
- Mechanical Engineering majors:
  MMAE 444, MMAE 485, BUS 305, ECE 218, ECE 242, ECE 441 (replaces PHYS 300).

Energy/Environment/Economics (E^3)
This minor consists of 15 semester hours. CHE 543,

- Six (6) credit hours from the following courses: CHE 465, CHE 467, CHE 489, CHE 491, CHE 522, CHE 541, CHE 565, CHE 582, ECE 319, ECE 411, ECE 419, ECE 420, ECE 438, MMAE 424, MMAE 425, MMAE 426 or MMAE 522, MMAE 524, MMAE 525.
- Six (6) credit hours from the following courses: ENVE 426, ENVE 404, ENVE 463, ENVE 485, ECE 491, ECE 497, MMAE 491, MMAE 494, MMAE 497, ECON 423, or PS 338. Appropriate substitution may be made with the approval of the program advisor.

Engineering Graphics and CAD
EG 105 or (CAE 100 and CAE 101), EG 305, EG 306, EG 405, EG 406, EG 419.

English Language/Literature
Six credit hours of English linguistics courses, six credit hours of Literature courses, and a 3-credit hour course in either English linguistics or literature. At least 9 credit hours must be at or above the 300-level.

Entrepreneurship
BUS 210, BUS 361, BUS 371, two entrepreneurial IPROs (EnPROs), and one of the following courses: BUS 363, ECON 211, or ECON 423.

Environmental Engineering
This minor consists of 15 semester hours.

- Environmental Engineering:
  At least six credit hours from the following courses: ENVE 404, ENVE 426, ENVE 463, ENVE 485, ENVE 491.
- Civil Engineering:
  Six credit hours from the following courses: CAE 421, CAE 482, CAE 483, CAE 484.

Appropriate substitution may be made with the approval of the program advisor.

Graphics and CAD for Non-Engineers
EG 225, EG 325, EG 329, EG 425, EG 429.

History
At least 15 credit hours of history courses numbered 300 level or above must be completed. These courses should be chosen in consultation with minor advisor.

Human Resources
PSYC 221, PSYC 301, PSYC 310, PSYC 409 PSYC 455, PSYC 481.

Information Security
ITM 421, ITM 428, ITM 440, ITM 448, ITM 478.

Information System Administration
ITM 301, ITM 302, ITM 440, and six credit hours from the following courses: ITM 451, ITM 452, ITM 454, ITM 456.

Information System Network Management
ITM 440, ITM 441, ITM 448, ITM 471, and one of the following courses: ITM 456, ITM 461.

Information Technology and Management
ITM 301, ITM 302, ITM 421, ITM 440, ITM 471.

Internet Application Development
ITM 311, ITM 411, ITM 461, ITM 462, and one of the following courses: ITM 465, ITM 466, ITM 469, or an applicable COM course (with advisor approval).

Law and Society
At least 15 credit hours must be completed, including the following: PHIL 362, PS 318, PS 356, PS 365, PS/SOC 321.

Legal Studies
PHIL 362, PS 319, PS 356, PS 365, and one course chosen from the following: BUS 341, PHIL/COM 377, a law-oriented course such as CAE 473 or MMAE 435

Linguistics
Fifteen (15) credit hours of linguistics coursework, at least 9 of which must be at or above the 300-level, chosen in consultation with the minor advisor.

Literature
At least 15 credit hours in 300-level literature courses must be completed.

Management
see Business minor

Materials Science

- Mechanical Engineering majors:
  MMAE 365, MMAE 370, MMAE 463, and two of the following courses: MMAE 465, MMAE 468 or MMAE 472, MMAE 470, MMAE 476, MMAE 482 or MMAE 472.
- Aerospace Engineering majors:
  MMAE 365, MMAE 370, MMAE 463, and two of the following courses: MMAE 465, MMAE 468 or MMAE 472, MMAE 470, MMAE 476, MMAE 482 or MMAE 472, MMAE 485.
- Non-MMAE majors:
  MS 201, MMAE 365, MMAE 463, MMAE 465, and one of the following courses: MMAE 370, MMAE 468, MMAE 470

Mathematics and Science Education
MSED 200, MSED 250, MSED 300 and two additional MSED courses chosen in consultation with the minor advisor.

Military Science
MILS 101, MILS 102, MILS 201, (MILS 107 or MILS 202) (these courses will at times be interchanged) or attendance at military training; MILS 301, MILS 302, MILS 401, MILS 402.

Music
15 credits in music theory or practice taken at VanderCook College of Music. A maximum of three semester hours of performance courses may be used towards a minor. Students should contact Educational Services concerning applicability of courses toward graduation.

Naval Science
NS 101, NS 102 (Navy option), NS 201 (Navy option), NS 202 (attendance at the Naval Science Institute may be substituted for the preceding courses), NS 301 (Navy option), NS 302 (Navy option), NS 310 (Marine option), NS 401, NS 402, NS 410 (Marine option).

Operating Systems
CS 201, CS 331, CS 350, CS 351, CS 450.

Organizational Psychology
PSYC 221, PSYC 301, PSYC 303, PSYC 310, PSYC 409.

Philosophy
At least 15 credit hours of philosophy courses numbered 300-level or above.

Philosophy and Sociology of Science
At least 15 credit hours must be completed, including PHIL 341, and at least four of the following courses: PHIL 302, PHIL 326, PHIL 342, PHIL 343, PHIL 350, SOC 301, SOC 302, SOC 303.

Physics
PHYS 300 or PHYS 427, PHYS 308, PHYS 348, PHYS 405, PHYS 413.

Political Science
PS 200, PS 209, (PS 230 or PS 232), and 6 hours in political science electives at the 300-level or above. Courses from one Political Science specialization (see page 154) are recommended.

Polymer Science and Engineering
This minor consists of 15 semester hours.

- One course from the following:
  CHE 470, CHEM 470, MMAE 470.
- At least three courses from the following:
  CHE 538, CHE 555, CHE 575, CHE 581, CHEM 535, CHEM 537, CHEM 542, MMAE 483, MMAE 487, MMAE 579, MMAE 580, MMAE 581.
- Up to one course from the following:
  CHE 426, CHE 489, CHE 491, CHE 582, FPE 541, MMAE 451, MMAE 485.

Appropriate substitution may be made with the approval of the program advisor.

Premedical Studies
This specialized minor is intended for those students who plan to apply to a medical school, and have been approved by the Premedical Advisory Committee. Note: Students who major in biology or molecular biochemistry and biophysics satisfy the premedical studies course requirements.

- Biomedical Engineering:
  - Neural Engineering or
    Medical Imaging Track:
    CHEM 237, CHEM 239, CHEM 240 and at least six credit hours chosen from the following: BIOL 210, BIOL 214, BIOL 225, BIOL 401, BIOL 402, BIOL 404, BIOL 445, BIOL 446, BME 491 (1-3 credit hours), BME 495 (1-3 credit hours). If CHEM 237 or CHEM 239 is taken as an option, then add equivalent number of credit hours from courses listed above.
  - Cell and Tissue Track:
    CHEM 240, and at least 13 credit hours chosen from the following: BIOL 210, BIOL 214, BIOL 225, BIOL 401, BIOL 402, BIOL 404, BIOL 445, BIOL 446, BME 491 (1-3 credit hours), BME 495 (1-3 credit hours).
- Chemical Engineering:
  BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 240, CHE 426 or one 3-credit engineering science course.
- Chemistry:
  Students interested in pursuing chemistry as a premedical degree can elect the Bachelor of Science in Chemistry with emphasis in Biological Chemistry optional degree program which includes all of the necessary courses for entrance into medical school. Alternatively, students can pursue any of the other optional degree programs in chemistry but must take the following additional courses to be awarded the premedical minor: BIOL 107, BIOL 109, BIOL 115, BIOL 117, BIOL 214, and choose one of the following: BIOL 430 or BIOL 445.
- Electrical Engineering:
  BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239, CHEM 240.
- Materials Science and Engineering:
  BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 237, CHEM 239, CHEM 240.
- Mechanical Engineering:
  BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 125, CHEM 237, CHEM 239, CHEM 240.
- Computer Science:
  BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 124, CHEM 125, CHEM 237, CHEM 239, CHEM 240.
- Physics:
  BIOL 107, BIOL 109, BIOL 115, BIOL 117, CHEM 237, CHEM 239, CHEM 240.

Professional and Technical Communication
COM 421 plus 12 credit hours of communication coursework in consultation with the minor advisor.

Programming Languages
CS 201, CS 331, CS 350, CS 351, CS 440.

Psychology
At least 15 credit hours must be completed, including the following two required courses: PSYC 203, PSYC 221.

Public Administration
PS 200, PS 306, PS 314, PS 315, PS 351.

Rehabilitation Services
PSYC 410, PSYC 411, PSYC 412, PSYC 583, PSYC 590.

Sociology
SOC 200, SOC 203, plus an additional 9 credit hours chosen in consultation with the departmental advisor.

Software Engineering
CS 201, CS 331, CS 441, CS 445, CS 487.

Structural Engineering (non-CAE majors only)
CAE 303, CAE 304, CAE 307, CAE 310, CAE 315.

Technology and Human Affairs
At least 15 credit hours must be completed from the following: HIST 383, PHIL 370, PS 332, PS 338, PS/SOC 353, SOC 356, SOC 359, SOC 362.

Telecommunications
CS 116 or CS 201; ECE 403, ECE 407 and ECE 436; and two telecommunications electives chosen from CS 331, CS 450, or ECE 449.

Urban Affairs
HIST 350, HIST 352, PS 315, PS 317, and (SOC 350 or SOC 311).

Web Communication
COM 430, COM 431, COM 432, and two courses chosen in consultation with the minor advisor.

Special Programs

Dual Undergraduate Degree Options

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

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

Students interested in this program should consult a Department of Computer Science advisor. Freshmen entering IIT 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 advisor. Freshman entering IIT with a significant number of advanced placement credits may be able to complete both degrees in four years.

Bachelor of Science in Mechanical Engineering/Bachelor of Science in Aerospace Engineering/

Bachelor of Science in Materials Science and Engineering

A dual major in ME and AE, ME and MSE, or AE and MSE may often be completed in one or two additional semesters. Interested students should consult their advisor.

Bachelor's/Master's Degree Options

IIT's Bachelor's/Master's 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 dual 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 IIT. 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 advisors and department chairs, students may choose combined degree programs or select one of the following options.

B.S./M.S. Dual Degree in Applied Mathematics Program

For the four-and-1/2-year program, it is assumed that the student has completed 17 AP credits. In order to be specific, for the provided sample program on page 34, it is also assumed that these AP credits correspond to MATH 151, MATH 152, PHYS 123, and a 3-credit-hour Science Elective course.

For the 5-year program, it is assumed that the student has completed 8 AP credits. In order to be specific, for the provided sample program on page 35, it is also assumed that these AP credits correspond to MATH 151, and a 3-credit hour Science Elective course.

There are a few dual-delivery courses in the Applied Mathematics department, such as MATH 477/577, MATH 478/578, etc. Students in the program are not allowed to take these dual-delivery courses at both the 400-level and 500-level.

For the graduate degree, students must take at least two sequences out of four core areas, which are Applied Analysis (MATH 500/501), Discrete Applied Mathematics (MATH 553/554), Computational Mathematics (MATH 577/578), and Stochastics (MATH 543/544).

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, IIT offers young architects a unique opportunity for advanced graduate study in the Stuart School of Business.

IIT 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 advisors 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 one and a half more years of study.

Students considering the B.Arch./M.B.A. dual degree program should consult with undergraduate advisors 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, Professional experience in the business world is not required for consideration, allowing B.Arch. students to pursue their M.B.A. degree without interruption. Formal 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 4 M.B.A. courses, or 12 credits, 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. Advisors 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 Civil Engineering

Qualified students enrolled at IIT may earn both the Bachelor of Architecture and one of two professional masters' degrees in civil engineering. Students who seek the Master of Structural Engineering degree (MAS STE) must successfully complete the following courses as part of their undergraduate program in architecture:

MATH 151 Calculus I
MATH 152 Calculus II
MATH 251 Multivariate & Vector Calculus
PHYS 123 General Physics I: Mechanics
MMAE 200 Introduction to Mechanics
MMAE 202 Mechanics of Solids II
CAE 303 Structural Design I
CAE 304 Structural Analysis I
CAE 307 Structural Design II
CAE 310 Structural Analysis II
CAE 431 Steel Design
CAE 432 Concrete & Foundation Design

Students who seek the Professional Master's degree in Architectural Engineering should take

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

Students who seek the Master of Construction Engineering and Management (MAS 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 at IIT.

Bachelor of Science/Master of Business Administration

One of the most appealing career preparations is the combination of a bachelor's degree with the Master of Business Administration (M.B.A.) degree. IIT students who complete the necessary undergraduate management courses may earn both the bachelor's degree and the M.B.A. degree in about five years, rather than the usual six years. See above for B.Arch./M.B.A. program. Undergraduate courses, when included as part of the bachelor's degree program, replace graduate courses that are part of the M.B.A. program. This allows students to complete the M.B.A. with as few as 16 courses.

Students who are considering the Bachelor/M.B.A. program should consult with the Stuart School of Business undergraduate programs advisor as early as possible in their academic career in order to plan a program enabling them to receive the maximum number of advanced standing credits toward their M.B.A. Formal application to the M.B.A. program, which includes a Graduate Management Admission Test (GMAT) score, should be submitted prior to the completion of the seventh semester of the bachelor's program.

Bachelor of Science/Master of Public Administration

Qualified students who are interested in careers in the public sector may complete their BS and Master's Degree in Public Administration in five or fewer years.

The requirements for the Bachelor of Science in Political Science and Master of Public Administration are often completed in four and a half years. Requirements for a BS degree in engineering or science can be combined with an MPA degree and usually take somewhat longer, depending on the student's load each semester and his or her total program. Students interested in this option submit their request to the MPA program after their fourth semester. Qualified students are granted provisional admission to the program and begin taking the graduate level MPA courses, usually at the rate of one per semester. When the student has completed substantially all the requirements for the BS 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 his or her request for regular admission. By then, the student will have completed the MPA foundation courses. Students in this program receive credit toward their BS electives for two MPA courses and with the approval of the academic director, may receive credit toward their MPA degree for up to six hours of relevant undergraduate coursework.

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

Students in these programs study their undergraduate program at the Main Campus of IIT and the law school portion of the program at IIT's Chicago-Kent College of Law. Two combined undergraduate and graduate law degree programs are available.

Prelaw undergraduate students also have access to seminars, prelaw 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 and Juris Doctor degrees. Students apply to the Honors Law Program prior to the beginning of their freshman year. Acceptance by Chicago-Kent is automatic for those students who meet the minimum program requirements. Students are guaranteed a seat in the Chicago-Kent entering class provided that they meet the following criteria:

- maintain a 3.25 cumulative undergraduate GPA
- take the Law School Admissions Test (LSAT) by February of their third undergraduate year at IIT 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
- maintain a record consistent with the requirements of the bar examining program

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 years of undergraduate study. In reviewing such applications, consideration will be given to the student's participation in the Honors Law Program.

Students who major in biology, chemistry, computer information systems, humanities, physics, political science, professional and technical communications, or psychology pursue an accelerated, focused course of study and normally complete both their B.S. and J.D. degrees in six years instead of the usual seven years. Students in other majors may also be able to accelerate completion of both degrees.

Business Honors Law Program

The Business Honors Law Program allows students to obtain both a B.S. in Business Administration and a J.D. degree. Students apply to the Business Honors Law Program prior to the beginning of their freshman year. Business Honors Law students are guaranteed admission to Chicago-Kent College of Law provided they meet the following criteria:

- maintain a 3.25 cumulative undergraduate GPA
- take the Law School Admissions Test (LSAT) by February of their third undergraduate year at IIT 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
- fulfill the undergraduate requirements specified by the B.S.B.A. program and complete the required undergraduate courses
- maintain a record consistent with the requirements of the bar examining program

Students who participate in the program but do not meet the academic standards for guaranteed admission are invited to apply through the regular competitive application process for admission to Chicago-Kent College of Law after three years of undergraduate study.

While the B.S.B.A. program is a full 4-year program, students in the Business Honors Law Program have the possibility of accelerating the curriculum to complete the B.S. and the J.D. in 6 years. This will require incoming Advanced Placement credit and/or summer school and should be discussed with an academic advisor.

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

In addition to premedical studies, IIT offers three dual degree programs. Students earn a bachelor's degree from IIT 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.

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

The IIT/Midwestern B.S./D.O. program is an eight year program open to freshmen applicants in which students complete their undergraduate B.S. degree at IIT 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 D.O. degree.

IIT/Rush Medical College B.S./M.D. Early Admission Program (4+4)

The IIT/Rush Medical College Program is an early admission program open to sophomores and to students attending other colleges or universities who transfer to IIT. Students must demonstrate high academic standards and research experience prior to admittance. This program is not open to international students. The MCAT is required. Students admitted to this program will complete their undergraduate B.S. degree at IIT in a major of their choosing. As part of this experience, they will participate in a year-long research project that bridges engineering, science, and medicine. The final four years are spent at Rush Medical College, during which time the student earns the M.D. degree. This program is designed for students who intend to become research-oriented physicians.

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

The IIT/ICO program is an early admission program open to sophomores. Students admitted to the program complete three years at IIT taking courses leading to a B.S. in Biology and four years at Illinois College of Optometry. IIT 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 B.S. in Biology from IIT after completing the first year at ICO and receive the Doctor of Optometry degree after completing all requirements at ICO. Students must maintain high academic standards and perform satisfactorily on the OPT (Optometry Admissions Test).

Premedical Programs

Department Web site: www.iit.edu/~premed

IIT provides excellent preparation for students planning to attend medical or other health-related professional schools. Students majoring in various fields, listed below, earn a B.S. 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 (see pages 158–162). 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 (see pages 158–162).

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. IIT'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 advisor 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 IIT science courses that fulfill the premedical requirements of most medical schools:

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

To improve performance during the first year in medical school or to prepare for the MCAT, the following courses are recommended:

BIOL 214	Genetics
BIOL 403	Biochemistry Lectures
BIOL 430	Animal Physiology
BIOL 445	Cell Biology
PHYS 224	General Physics III for Engineers

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) (BCPS)
Konstintinos Arfanakis (BME)
Nick Menhart (BCPS)
Satish Parulekar (CHBE)
Michael Young (PSYC)

Coordinator
Cathie D'Amico
116 Engineering 1
312.567.8852

Coordinator
Todd Kersh
182 Life Sciences
312.567.7986

Post-Baccalaureate Premedical Program

The purpose of the Post-Baccalaureate Premedical Program is to meet the needs of college graduates who have decided to pursue a medical education but who have taken none or only some 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 which are required for admission to any medical, osteopathic or veterinary school in the country. Students who satisfactorily complete the program will be awarded a Certificate in Premedical Sciences.

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, beyond precalculus, including at least one term of calculus. Statistics is recommended as the second mathematics course.
- 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.

Advising and Support

On the main campus of Illinois Institute of Technology there are a number of advisors, who together constitute the Premedical Advisory Committee, see: **www.iit.edu/~premed/**. Post-Baccalaureate premedical students will be assigned an advisor 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 Post-Baccalaureate Premedical 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 IIT Honors Medical Society 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. The Princeton Review offers MCAT Preparatory courses at reduced cost to IIT students in the Spring semester each year. Post-Baccalaureate Premedical Students are invited and encouraged to attend weekly colloquia in the biological, chemical and physical sciences and in other departments offering seminars of medical interest. Finally, IIT's location in the city of Chicago is a special advantage to students in the Post-Baccalaureate Premedical 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 IIT post-baccalaureate premedical 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, IIT post-baccalaureate premedical students will be held to high academic standards. At a minimum, students must maintain a cumulative grade point average of 3.00 to remain in the program. Likewise, medical schools have high expectations about an applicant's character. Students in the IIT Post-Baccalaureate Premedical 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 Post-Baccalaureate Premedical 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 grade point average 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 undergraduate admissions office for full consideration.

Certificate and Post-Baccalaureate Certificate Programs

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. Consult the civil and architectural engineering section 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.

The Institute of Psychology offers a certificate in Industrial Training. This certificate is designed to help either the experienced skilled worker or a technically educated person to learn methods of knowledge delivery in industrial training settings.

Post-Baccalaureate Certificate Programs

The departments at IIT that offer graduate certificate programs are: Biological, Chemical and Physical Sciences; Chemical and Biological Engineering; Civil, Architectural and Environmental Engineering; Computer Science; Electrical and Computer Engineering; Information Technology and Management; Mechanical, Materials and Aerospace Engineering; National Center for Food Safety and Technology; Public Administration; Lewis Department of Humanities; and the Institute of Psychology.

For a complete list of graduate certificate programs; consult the current *IIT Bulletin: Graduate Programs*.

Pre-Pharmacy Program

IIT 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 IIT'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 IIT; maintain a minimum cumulative pre-pharmacy grade point average 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 IIT and who are admitted to CCP in the Dual Acceptance Program.

For further information see **www.midwestern.edu**.

Study Abroad

IIT encourages students of all majors to consider studying abroad for part of their undergraduate career. Studying abroad enriches the college experience by providing a different intellectual and cultural environment and often enriches the academic program by giving breadth to the major discipline.

Students wishing to participate in an exchange program or to study abroad should first contact the International Center for information, application forms, and procedural guidelines. The application process should begin approximately one year before study abroad is anticipated. Only students whose applications are approved by the Study Abroad Committee are permitted to participate in an exchange program or a study abroad program. For more information, please visit the Study Abroad website at **studyabroad.iit.edu**.

General Exchange Programs

IIT has undergraduate exchange programs with the following universities: Institut National des Sciences Appliquées de Lyon (INSA-Lyon), Lyon, France; The Royal Institute of Technology (KTH), Stockholm, Sweden; University of Oviedo, Austurias, Spain; AGH University of Science and Technology (AGH), Krakow, Poland; and University College Cork (UCC), Cork, Ireland.

Business Exchanges

Students majoring in business may participate in the following exchange programs: Instituto Tecnologico de Monterrey, Monterrey, Mexico; Pforzheim University, Pforzheim, Germany and Singapore Management University, Singapore.

Engineering/Computer Science Exchanges

IIT is member of the Global Engineering Education Exchange (GE^3), allowing students to take engineering and computer science courses abroad as an exchange student in over 20 countries, many courses taught in English.

General Study Abroad Opportunities

IIT has many ties with universities around the world where students can earn IIT credit with courses provided in English or in a foreign language. Prior to participating in a study abroad program, a student must meet the international university's admission criteria and must submit an academic plan of study. Recently, students have attended universities in Australia, England, France, Germany, Mexico, Italy, Singapore, Sweden, Japan, Korea, and more.

IIT Program in Paris, France

IIT offers a summer program in Paris led by IIT faculty for students in any major. IIT's College of Architecture manages a semester based program in Paris, France where architecture majors can take classes with IIT faculty.

Joint Programs

IIT has established joint programs with the following Chicago-area institutions: DePaul University, Wheaton College, Benedictine University, Elmhurst College, Dominican University and University of St. Francis. These programs differ from a 3+2 transfer program in that students earn two degrees: a bachelor's degree in an engineering discipline from IIT 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 IIT. For additional information, students should contact the Office of Undergraduate Admission (see page 10).

Dual Admissions Programs

IIT has established dual admissions 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 4 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 Information Technology and Management or Psychology sections of this bulletin, under Optional Programs, or contact the Office of Undergraduate Admission (see page 10).

Reserve Officers Training Corps (ROTC)

ROTC programs are available as minors in the regular IIT 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/IIT combined scholarships in many cases allow winners to attend IIT free of charge. Contact the IIT Admission Office or any of IIT's ROTC departments for scholarship/program information.

Shimer College

Shimer College, a small liberal arts college devoted principally to studying the Great Books, is located on the IIT-Chicago campus. The study of classic texts, in discussion classes of 12 students or fewer, offers a uniquely rigorous and stimulating four-year liberal arts education.

IIT students in good standing may take courses at Shimer College. Many Shimer College courses may be used as electives in IIT degree programs. Admission to Shimer College classes is on a space-available basis and students may be asked to satisfy other requirements prior to acceptance into a Shimer College class. All students must be approved by both Shimer College and IIT to enroll in these classes. Please contact the Office of Undergraduate Academic Affairs (**ugaa@iit.edu**) for further information.

Shimer students who wish to take classes at IIT should contact the Office of Undergraduate Admission (see page 10).

VanderCook College of Music

Full-time IIT students in good standing may take courses offered at VanderCook College of Music. The following VanderCook courses, HIST 203, HIST 204, HUM 301, and FT 301 may be used as humanities electives in all IIT degree programs. A maximum of three semester hours of performance courses may be used as free electives. Please contact the Office of Undergraduate Academic Affairs 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 of the IIT Bursar's office also is required since there is a fee for taking a course at VanderCook.

Course Descriptions

Course Descriptions

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Alpha-Numeric Indicators

Numbers in Parenthesis

The required number of lecture hours, laboratory hours, and credit hours are indicated at the end of each course description. For example, (3-0-3).

Course Identifiers

- **(C)** Identifies courses that fulfill the communications general educational requirements
- **(D)** CAE design courses
- **(E)** Ethics content
- **(H)** Identifies courses that fulfill the humanities general educational requirements
- **(N)** Identifies courses that fulfill the natural science or engineering general educational requirements
- **(P)** ECE, CPE professional elective
- **(S)** Identifies courses that fulfill the social sciences general educational requirements
- **(T)** CS technical elective

Art and Architectural History

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
(3-0-3) **(C)(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
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(H)**

AAH 322
19th Century American Art & 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)]
(3-0-3) **(C)(H)**

AAH 323
20th Century American Art & 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)]
(3-0-3) **(C)(H)**

AAH 380
Topics in Art & 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)]
(3-0-3) **(C)(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): [(HUM 102) OR (HUM 104) OR (HUM 106)] AND [(AAH 119 and AAH 120)]
(3-0-3) **(C)(H)**

AAH 491
Independent Reading & Research

For advanced students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(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.
Prerequisite(s): [(AAH 119 and AAH 120)] AND [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(H)**

Anthropology

ANTH 300
Anthropology of Technology
Studies technology from a cross-cultural perspective, using modern ethnographic and historical case studies. The course examines an assortment of technologies and end-products by looking at the social, economic, and ideological contexts in which they are embedded.
Prerequisite(s): [One 200-level course in Political Science OR One 200-level course in Sociology]
(3-0-3) **(C)(S)**

Architecture

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. Open only to Architecture majors.
(2-1-3) **(C)**

ARCH 109
Freehand Drawing I
Drawing from still life, human figure, and architecture, both out-of-doors and in the studio; drawing from life in various media. Open only to Architecture majors.
(0-4-2)

ARCH 110
Freehand Drawing II
Drawing from still life, human figure, and architecture, both out-of-doors and in the studio; drawing from life in various media. Open only to Architecture majors.
Prerequisite(s): [(ARCH 109)]
(0-4-2)

ARCH 113
Architecture Studio I
Studio exercises to develop excellence in craftsmanship and visual sensitivity as a foundation for a basic architectural language. Problems of various lengths will deal with the technical skills of drawing and model-making materials and in both two and three dimensions. Using problems of both an abstract and an architectural character, this course will build verbal communication skills and model shop ability. Open only to Architecture majors.
(0-12-6) **(C)**

ARCH 114
Architecture Studio II
Studio exercises to develop excellence in craftsmanship and visual sensitivity as a foundation for a basic architectural language. Problems of various lengths will deal with the technical skills of drawing and model-making materials and in both two and three dimensions. Using problems of both an abstract and an architectural character, this course will build verbal communication skills and model shop ability. Open only to Architecture majors.
Prerequisite(s): [(ARCH 113)]
(0-12-6) **(C)**

ARCH 125
Introduction to Architectural Computing
The class introduces concept development, design thinking and problem solving related to architectural representation and production technique (digital and analog). The class will look critically at recent digital design developments, as well as introduce students to the history of each “type” of computer program; and the class will introduce students to the basic skills required to productively work with a variety of practice-based software programs. The class will also introduce 3D “craft-based” thinking/working.
(1-2-3)

ARCH 201
Architecture III: Structures, Building Systems, & Assemblies
The development of architectural principles through the study and analysis of building materials. Development of the graphic language in architecture. Consideration of the appropriate use of materials, energy, and clear construction as the basis of architecture. Open only to Architecture majors.
Prerequisite(s): [(ARCH 113 and ARCH 114)]
(0-10-5)

ARCH 202
Architecture IV: Structures, Building Systems, & Assemblies
The development of architectural principles through the study and analysis of building materials. Development of the graphic language in architecture. Consideration of the appropriate use of materials, energy, and clear construction as the basis of architecture. Open only to Architecture majors.
Prerequisite(s): [(ARCH 113, ARCH 114, and ARCH 201)]
(0-12-6)

ARCH 226
Computer-Aided Design in Practice
Review of drafting, modeling and rendering computer hardware and software used in the practice of architecture design. Design and management issues are explored with the extensive use of PC CAD systems, including AutoCAD. Contemporary practice applications are discussed.
Prerequisite(s): [(ARCH 125)]
(2-2-3)

ARCH 230
Structure & Architecture
The theory and concepts of structures are presented with a visual format and models to emphasize an intuitive comprehension of the fundamental principles of structural behavior including loading, shear and bending moments. Architectural examples of integrated structures then become format to introduce an understanding of materials and the design process to quantify the engineering. Masonry load-bearing walls and the arch are used as the initial examples to correlate intuition and engineering calculations.
Prerequisite(s): [(PHYS 123) OR (PHYS 200) OR (PHYS 211 and PHYS 212)]
(3-0-3) **(N)**

ARCH 305
Architecture V
Continued development of architectural principles of ARCH 201 and 202 through the correlation of design process and building systems. Consideration of the interrelation of building, programming, site planning, structure, enclosure systems, energy consumption, and environmental control systems, and the cultural concepts supporting their organization. Open only to Architecture majors.
Prerequisite(s): [(ARCH 201, ARCH 202, and ARCH 230)]
(0-12-6)

ARCH 306
Architecture VI
Continued development of architectural principles of ARCH 201 and 202 through the correlation of design process and building systems. Consideration of the interrelation of building, programming, site planning, structure, enclosure systems, energy consumption, and environmental control systems, and the cultural concepts supporting their organization. Open only to Architecture majors.
Prerequisite(s): [(ARCH 201, ARCH 202, ARCH 230, and ARCH 305)]
(0-12-6)

ARCH 321
History of Modern Thought in Architecture: 20th Century
Mies, Gropius, Le Corbusier, and others constructed modernist canon as much with their manifestos-provocative, assertive, entirely subjective texts packaged in the rhetoric of objectivity-as with their buildings. This course studies the major texts and concepts that have produced architecture in the twentieth century. Study will be made of the modernist legacy and its basis in a canon that has experienced transformations across the course of decades, while retaining essential principles and mythic status today.
(3-0-3) **(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.
(3-0-3)

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)]
(3-0-3)

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 331 and ARCH 332)]
(3-0-3)

ARCH 334
Frame Structural Systems & Steel
Based on a statics and strength of materials, analysis of tension, compression and bending, timber and steel members are designed into truss or column and beam structural systems. Connections and sheer walls are studied as the transfer of moments to resolve dynamic loads in multiple frames. This engineering knowledge is then directly integrated into the parallel studio experience of developing an architectural project that focuses on steel as the structural material.
Prerequisite(s): [(ARCH 230 and PHYS 200)]
(3-0-3) **(N)**

ARCH 335
Reinforced Concrete & Continuous Structure
The plastic qualities of reinforced concrete are studied as an internal distribution of forces based on the continuity of the material. These same principles also apply to all dome, cable and membrane structures. Complete structural systems of concrete are developed with footings, columns, shear walls, and horizontal plate options. More advanced applications include tension systems and thin shell construction. These engineering experiences are then integrated into the practice of designing an architectural studio project based on reinforced concrete as the structural material.
Prerequisite(s): [(ARCH 230, ARCH 334, and PHYS 200)]
(3-0-3) **(N)**

ARCH 403
Mechanical & Electrical Building Systems for Architects 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. Open only to Architecture majors.
Prerequisite(s): [(ARCH 201 and ARCH 202)]
(3-0-3)

ARCH 404
Mechanical & Electrical Building Systems for Architects 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. Open only to Architecture majors.
Prerequisite(s): [(ARCH 403)]
(3-0-3)

ARCH 408
Freehand Drawing
A multi-purpose drawing course offering students a chance to develop on-site sketching skills and creative expression in drawing through a combination of sketching field trips and in-class drawing assignments. Open only to Architecture majors.
(0-3-3)

ARCH 409
Advanced Freehand Drawing
Advanced development of freehand drawing skills in various mediums; still life, human figure, the natural and built environment, studio and field settings. Open only to Architecture majors.
Prerequisite(s): [(ARCH 408)]
(0-3-3)

ARCH 413
Architectural Practice
Lectures and practical problems dealing with specifications, specification writing, administration of construction, contracts, building law and professional practice.
(3-0-3) **(C)**

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.
(3-0-3) **(C)**

ARCH 417
Architecture VII
Structure as an architectural factor; space as an architectural problem; proportion as a means of architectural expression; the expressive value of materials; painting and sculpture in their relationship to architecture. Application of principles in comprehensive projects involving program, site, and code analysis. Open only to Architecture majors.
Prerequisite(s): [(ARCH 334, ARCH 335, ARCH 403, and ARCH 404)]
(0-12-6)

ARCH 418
Architecture VIII
Structure as an architectural factor; space as an architectural problem; proportion as a means of architectural expression; the expressive value of materials; painting and sculpture in their relationship to architecture. Application of principles in comprehensive projects involving program, site, and code analysis. Open only to Architecture majors.
Prerequisite(s): [(ARCH 417)]
(0-12-6)

ARCH 419
Architecture IX
These studios represent the most extended and developed exercises in macro planning issues. First priority is given to the urgent needs of our environment such as housing, schools, or community buildings for urban centers; projects reinforce the entire curriculum, emphasizing complex relationships of buildings in an urban landscape taking all factors into consideration. Students increase their ability to make value judgments, and learn to critically review, test, and improve conventional concepts of architecture relative to current demands placed upon the profession. These studios also offer students a variety of possible specialization topics. Open only to Architecture majors.
Prerequisite(s): [(ARCH 417 and ARCH 418)]
(0-12-6)

ARCH 420
Architecture X
These studios represent the most extended and developed exercises in macro planning issues. First priority is given to the urgent needs of our environment such as housing, schools, or community buildings for urban centers; projects reinforce the entire curriculum, emphasizing complex relationships of buildings in an urban landscape taking all factors into consideration. Students increase their ability to make value judgments, and learn to critically review, test and improve conventional concepts of architecture relative to current demands placed upon the profession. These studios also offer students a variety of possible specialization topics. Open only to Architecture majors.
Prerequisite(s): [(ARCH 417, ARCH 418, and ARCH 419)]
(0-12-6)

ARCH 421
Energy Conscious Design I
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.
(3-0-3)

ARCH 422
Energy Conscious Design 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)]
(3-0-3)

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.
(3-0-3) **(C)**

ARCH 424
Architectural Construction Management
A survey of the techniques and procedures of construction management as it relates to architectural practice. The organization of the building team, the collaborative design process, cost control, project scheduling, purchasing, accounting, and field supervision are described and documented.
(3-0-3)

ARCH 427
Image Processing in CAD
A review of 3-D modeling concepts, computer-aided rendering concepts, and methods in the development of architectural design. Extensive use of PC CAD software is expected.
Prerequisite(s): [(ARCH 125 and ARCH 226)]
(3-0-3)

ARCH 428
3D Animation in CAD Presentations
Review 3-D modeling concepts for animation, preparing camera movements, lighting conditions, special effects, and the digital editing of animation sequences. Extensive use of PC animation and editing software.
Prerequisite(s): [(ARCH 427)]
(1-3-3)

ARCH 429
CAD Programming
Review programming in CAD systems, programming basics in AutoCAD, extensive creation of 2-D and 3-D objects, data interrogation, manipulation, and extraction, and 2-D and 3-D parametric- and rule-based design. Investigation of form creation, based on mathematical relationships and random generation.
Prerequisite(s): [(ARCH 427)]
(1-3-3)

ARCH 430
Web Technology
Study of the relationship between the built environment and networked technologies. Students will learn principles of designing for networked digital space, ways of augmenting physical space through digital technologies, and how networks and web based communication have transformed the practice of architecture and our daily lives.
Prerequisite(s): [(ARCH 427)]
(3-0-3)

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 506 and ARCH 507)]
(1-2-3)

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 506 and ARCH 507)]
(1-2-3)

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. 1. Survey of CAD/CAM/GIS use in practice and component manufacturing including modeling, simulation, and scripting. 2. Behavioral models of components using simulation and analysis tools (flow, system dynamics, etc.) 3. Use of CAD tools to model components for production (modeling for CNC considering toolpaths and jigs). 4. Use of CAD tools to analyze properties of components. 5. Material properties and related fabrication constraints. 6. Current fabrication processes 7. Use of IIT-owned CNC tools to fabricate components 8. Rapid prototyping
Prerequisite(s): [(ARCH 427) OR (ARCH 467)]
(1-2-3)

ARCH 445
Prairie School & Naturalistic Landscape Design
This significant Midwestern style of landscape and architectural design provided the beginnings of ecology and continues to influence landscape design today. The course specifically addresses the work of designers such as Jens Jensen, O.C. Simonds, and Frank Lloyd Wright, and features IIT's Alfred Caldwell. Students receive an introduction to the types of plants used by these designers and the connections between landscape and architecture will be explored.
(3-0-3)

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.
(3-0-3)

ARCH 447
Architecture & 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.
(1-2-3)

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.
(3-0-3)

ARCH 456
Topics in Modernism
Historical and critical study of a significant topic in architecture and urban design tied to important building types, architectes, architectural movements, historical periods, or theoretical trends of lasting significance in the twentieth century. Conducted as a seminar, this course analyzes texts, writings, and buildings as students prepare research papers, presentations, and other projects. Recent courses have examined Modernism in post-World War II Europe and the United States, and the history of the skyscraper from the Chicago School to the present.
(3-0-3) **(C)**

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. Only for 5th year Architecture majors.
(3-0-3)

ARCH 461
Entrepreneurship & 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. Only for 5th year Architecture majors.
(3-0-3)

ARCH 462
Planning Law & 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. Only for 5th year Architecture majors.
(3-0-3)

ARCH 463
Introduction to Real Estate 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. Only for 5th year Architecture majors.
(3-0-3)

ARCH 464
Comprehensive Opportunity Assessment & Entrepreneurship Development Project/Practicum
Two options are available to the student for the acquisition and assimilation of the breadth of knowledge required to bring project ideas to fruition: The Comprehensive Development Project is a capstone effort which will demonstrate project concept, planning resolution, land acquisition strategies, estimating, scheduling, financial pro-forma, and value capture intents. The Practicum would entail employment at a vetted office engaged in the actual process of project assembly. A position requiring a minimum of 20 hours per week, prior review and approval of the work plan, and submittal of documentation of the work undertaken would be required for this scenario. The ultimate objective is to provide a roadmap of the interaction between the architect- entrepreneur, market opportunities, and integrated building delivery practices which facilitate the development of student skills necessary to compete in a rapidly changing socio-economic environment. This course is designed to help students learn and use tools and frameworks to create, implement, and update a strategic plan to shape the future and guide an entrepreneurial organization on its path to success. This course will entail collaboration with real world organizations, including city agencies, community development corporations, IIT Department of Community Affairs, or private developers. Only for 5th year Architecture majors.
(6-0-6)

ARCH 465
Construction & 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.
(3-0-3)

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. Only for 5th year Architecture majors.
(3-0-3)

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.
(1-4-3)

ARCH 468
Drawing From Travel
A drawing 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. Requisite: European Study Program or Paris Program
(0-6-3)

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
(3-0-3)

ARCH 470
Image City: Mediation of Space
This seminar surveys the interaction between media and the city from the 19th century to the present. A history of the technological innovations of the last two hundred years turns out to be, in large part, a history of the development of the contemporary city, and no account of contemporary urban issues can be considered complete without taking into account the role played in our lives by the media. Accordingly, every space we encounter or create has to be considered mediated.
(3-0-3)

ARCH 473
Conflict & Time
This seminar employs comparative studies of other arts, in particular cinema, to illuminate architectural esthetics and the creative process.
(3-0-3)

ARCH 474
Production/Design
This seminar examines aspects of design in motion pictures. The premise underlying the course is that the act of perception constitutes an act of design; we produce and design the world we perceive. This becomes particularly evident through analysis of the artificially constructed, illusory reality of films.
(3-0-3)

ARCH 475
Spatial Stories
This course will examine the spatial story as it appears in diverse media: short fiction, films, everyday discourse, the media architecture, etc. The course work 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.
(3-0-3) **(C)**

ARCH 485
Structures I: Concepts
Examination of the basic and vast range of structural concepts and solutions, in an illustrated and summary format. Examples include historic as well as contemporary structures. Statics and strength of materials, beam theory, shear and bending moment diagrams, deflection analysis. Overview of systems choices in architectural applications. History of strength of materials.
(3-0-3)

ARCH 486
Structures II: Design of Wood & Steel
Analysis, design and detailing of tectonic systems (steel and wood). Design of compression, tension and flexural members. Design of timber beams and columns. Design of steel beams and columns. The behavior of structures under static and dynamic loads. Analysis, design and detailing of concrete and masonry systems. Theory of reinforced concrete applied to beams and slabs.
Prerequisite(s): [(ARCH 485)]
(3-0-3)

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.
(3-0-3)

ARCH 488
Long-Span & 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.
(3-0-3)

ARCH 489
Structural Systems for Tall Buildings & Long-Span Structures
This course reviews the historical development of the interaction of the structure with architecture and explores future trends and directions. The suitability of different materials and systems will be studied, with emphasis placed on efficiency.
(3-0-3)

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.
(3-0-3)

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)

Additional Undergraduate and Graduate Courses

Note
Graduate Courses are available under limited conditions to degree-seeking undergraduate students with the approval of the course instructor. In general, and only when maximum enrollment has not been met, undergraduates must have completed relevant advanced-level undergraduate courses in the subject. Students should notify their academic advisor when they have completed a graduate course to ensure the course is recognized as an architecture elective.

Architecture

ARCH 500
History of Architectural Ideas I

ARCH 501
History of Architectural Ideas II

ARCH 502
Advanced Topics in History and Theory I

ARCH 503
Advanced Topics in History and Topics II

ARCH 509
Topics in Advanced Technology

ARCH 553
High-Rise Building Technology I

ARCH 554
High-Rise Building Technology II

City and Regional Planning

CRP 201
The Dwelling

CRP 203
Housing & Housing Types

CRP 425
History & Architecture of Cities I

CRP 426
History & Architecture of Cities II

CRP 465
The Ecological Basis of Planning

CRP 470
Urban Form in History: Pre-20th Century

CRP 472
Low-Rise Urbanism: House Components, Form/Cluster Design

CRP 519
Principles of City Planning I

CRP 520
Principles of City Planning II

Landscape Architecture

LA 414
Professional Practice

LA 443
Forests, Preserves, Parks, and Urbanscapes

LA 501
Nature of Ecology

LA 502
Landscape Architectural History: From Antiquity to Olmsted

LA 503
Advanced Contemporary Theory: Case Studies

LA 515
Firms, Parks, Developers

LA 516
Historic Landscape Preservation

LA 545
Studio V: Advanced Landscape Design Investigations

LA 546
Studio VI: Advanced Landscape Design Investigations

LA 565
Ecology and Materials Workshop I: Plants and Planting

LA 566
Ecology and Materials Workshop II: Earthworks and Infrastructures

LA 567
Ecology and Materials Workshop III: Horticulture and Design

LA 568
Ecology and Materials Workshop IV: Manufacturing the Urban Environment

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Air Force Aerospace Studies

Note
Leadership Laboratory is required when enrolling in any Air Force Aerospace Studies course.

Leadership Laboratory
A study of Air Force customs and courtesies, drills and ceremonies, issuing military commands, instructing, directing and evaluating the preceding skills, studying the environment of an Air Force officer, and learning about the areas of opportunity available to commissioned officers. Planning and controlling of military activities of the cadet coprs, preparation and presentation of briefings, and other oral and written communications. Providing interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

AS 101
The Foundations of the USAF I
Introduction to the U.S. Air Force and Air Force ROTC. This course will focus on officership and professionalism, military customs and courtesies, health and physical fitness, and drill and ceremonies. Leadership Laboratory will continue to emphasize the application of customs and courtesies, health and physical fitness, and drill and ceremonies.
(1-2-1) **(C)**

AS 102
The Foundations of the USAF II
Introduction to history and organization of the U.S. Air Force. The origin of the Air Force will be described, and the current command structure will be reviewed. Leadership Laboratory continued.
(1-2-1) **(C)**

AS 201
The Evolution of USAF Air & Space Power I
Examines general aspects of air and space power through a historical perspective. Historical examples are provided to show the development of Air Force capabilities and missions from early flight through the Korean War. Leadership Laboratory continued.
(1-2-1) **(C)**

AS 202
The Evolution of USAF Air & Space Power II
Continuing study of topics covered in AS 201. Covers the period from the Vietnam War through today. Leadership Laboratory continued.
(1-2-1) **(C)**

AS 301
Air Force Leadership Studies I
Study of leadership authority, principles and accountability, management fundamentals, oral and written presentation and counseling skills required of an Air Force junior officer. Leadership Laboratory complements this course by providing leadership experience in officer-type activities.
(3-2-3) **(C)**

AS 302
Air Force Leadership Studies II
Study of professional knowledge, motivation, empowerment, mentoring, delegation, Air Force personnel and evaluation systems, leadership ethics, and oral and written presentation skills required of an Air Force junior officer. Continuation of Leadership Laboratory.
(3-2-3) **(C)**

AS 401
National Security Affairs
This course is designed for college seniors, it gives them the foundation to understand their role as military officers in American society. The course closely examines the national security process, regional studies, Air Force doctrine, and current issues affecting the military profession. Emphasis is also given on refining oral and written communication skills. Continuation of Leadership Laboratory.
(3-2-3) **(C)**

AS 402
Preparation for Active Duty
Designed for college seniors, it gives them the foundation to understand their role as military officers in American society. This course builds upon the subject matter previously covered in AS 401 and also further examines regional studies, advanced leadership, ethics, military justice, the military as a profession, and officership. Preparation for active duty life is one of the core elements of this course, and students will learn the role of an Air Force commander in addition to different services and programs available on a military installation. Emphasis is also given on refining oral and written communication skills. Continuation of Leadership Laboratory.
(3-2-3) **(C)**

Biology

BIOL 100
Introduction to the Profession
Introduction to the biological sciences, scientific method, computing tools, and critical thinking.
(2-0-2) **(C)**

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.
(3-0-3)

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 107*)] An asterisk (*) designates a course which may be taken concurrently.
(0-3-1) **(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. Course does not satisfy graduation requirements for Biochemistry, Biology, Biomedical Engineering, Chemical Engineering or Molecular Biochemistry and Biophysics majors.
(3-0-3)

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.
(3-0-3)

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.
(0-3-1) **(C)**

BIOL 210
Microbiology Lectures
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)]
(3-0-3)

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)]
(3-0-3)

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.
(0-4-2) **(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)]
(3-0-3)

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 114) OR (BIOL 115)]
(3-0-3)

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, BIOL 115, and CHEM 237)]
(3-0-3)

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 237)]
(3-0-3)

BIOL 403
Biochemistry Lectures
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 and BIOL 115) OR (CHE 311)] AND [(CHEM 237)]
(4-0-4)

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.
(0-6-3) **(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)]
(3-0-3)

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.
(3-0-3) **(C)**

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, BIOL 115, BIOL 401*, BIOL 445*, and CHEM 237)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BIOL 430
Animal Physiology
Respiration; circulation; energy metabolism; temperature regulation; water and osmotic regulation; digestion and excretion; muscle and movement; nerve excitation; information control and integration; and chemical messengers. Emphasis on general principles with examples drawn from various animal phyla.
Prerequisite(s): [(BIOL 107) OR (BIOL 114) OR (BIOL 115)]
(3-0-3)

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)]
(3-0-3)

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.
(0-6-3) **(C)**

BIOL 451
Biological Literature
Library research on advanced topics in biology followed by oral presentations of this research. Requires senior standing.
Prerequisite(s): [(BIOL 400-499)]
(2-0-2) **(C)**

BIOL 490
Individual Study
Individual study. Consent of instructor required.
(Credit: Variable) **(C)**

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.
(Credit: Variable) **(C)**

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.
(1-0-1) **(C)**

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

BIOL 503
Virology

BIOL 512
Advanced Biochemistry

BIOL 514
Toxicology

BIOL 515
Molecular Biology

BIOL 526
Developmental Biology

BIOL 527
Immunology and Immunochemistry

BIOL 542
Advanced Microbiology Lectures

BIOL 550
Bioinformatics and Biotechnology

BIOL 555
Macromolecular Structure Determination

BIOL 562
Current Topics in Functional Genomics

Biomedical Engineering

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. Open only to Biomedical Engineering majors.
(3-0-3) **(C)**

BME 200
Biomedical Engineering Application of MATLAB
This course will provide students an opportunity to learn how to use the MATLAB programming environment to solve biomedical engineering problems. Students will learn basic MATLAB functions for importing, analyzing, visualizing, and exporting data, as well as computational techniques for modeling and solving quantitative engineering problems. Examples will be taken from the three areas of specialization offered in the biomedical engineering department – cell and tissue engineering, neural engineering, and medical imaging. Open only to Biomedical Engineering majors.
Prerequisite(s): [(ECE 211*) OR (ECE 215*)] AND [(CS 115)] AND [(BME 100*)] An asterisk (*) designates a course which may be taken concurrently.
(0-3-1)

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. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BIOL 115, MATH 251, and MMAE 200)]
(3-0-3)

BME 309
Biomedical Imaging & Sensing
An introduction to concepts of imaging and sensing that underlie a wide range of biomedical imaging modalities. Topics covered include cell imaging, multiphoton microscopy for biomedical studies, molecular imaging, infrared imaging, biomedical magnetic imaging, X-ray imaging, nuclear medicine, magnetic resonance imaging, and ultrasound imaging. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 330* and PHYS 221)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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): [(BME 100 and CHEM 125)]
(3-0-3) **(C)**

BME 315
Instrumentation & Measurement Laboratory
Laboratory exercises stress instrumentation usage and data analysis used to determine physiological functions and variables and the relations to the physiological variability. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 200 and BME 330*)] An asterisk (*) designates a course which may be taken concurrently.
(1-3-2) **(C)**

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. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BIOL 115 and BME 315)]
(0-3-1) **(C)**

BME 330
Analysis of Biosignals & 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. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 200, ENVE 426*, and MATH 252)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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): [(BME 320*, CHE 202, and MATH 251)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 315)]
(1-3-2) **(C)**

BME 410
Transport Phenomena in Living Systems
Convective and diffusive movement and reaction of molecules in biological systems. Kinetics of homogeneous and heterogeneous reactions in biological environments. Mechanisms and models of transport across membranes. Convective diffusion with and without chemical reaction.
Prerequisite(s): [(BME 301 and MATH 252)]
(3-0-3)

BME 415
Concepts of Neural Engineering
Introduction to the fundamentals and principles of neural engineering. Emphasis is placed on pathological conditions that motivate the engineering design and clinical use of neural prosthetic devices. Pacemakers, FES stimulators, as well as CNS devices are examined, including extracorporeal and implantable systems.
Prerequisite(s): [(BME 315 and ECE 215)]
(3-0-3) **(C)**

BME 418
Reaction Kinetics for BME
This course is an introduction to the fundamentals of chemical kinetics with a focus 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): [(BME 301, BME 335, and MATH 252)]
(3-0-3)

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. Open only to Biomedical Engineering majors. Requires senior standing.
Prerequisite(s): [(BME 315, BME 320, and BME 330)]
(2-0-2) **(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)]
(3-0-3) **(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): [(BME 330 and MATH 252)]
(3-0-3)

BME 425
Concepts of Tissue Engineering
An introduction to the strategies and fundamental bioengineering design criteria behind the development of cell-based tissue substitutes. Topics include biocompatibility, biological grafts, gene therapy-transfer, and bioreactors.
Prerequisite(s): [(BME 310)]
(3-0-3) **(C)**

BME 430
Concepts of Medical Imaging
This course is an introduction to the basic concepts in medical imaging, such as: receiver operating characteristics, the rose model, point spread and transfer functions, covariance and autocovariance, noise filters, sampling, aliasing, interpolation, and image registration.
Prerequisite(s): [(BME 315)] AND [(PHYS 221) OR (PHYS 224)]
(3-0-3) **(C)**

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 and MATH 252)]
(3-0-3)

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. Open only to Biomedical Engineering majors.
Prerequisite(s): [(BME 315 and PHYS 221)]
(3-0-3)

BME 440
Bioelectric Interfaces
Examination of the fundamental principles and theory behind the interface between recording and stimulating electrodes and biological tissue. Equivalent circuit models for recording and stimulating electrodes are presented. Safety issues, and electrochemical stability of stimulating electrodes are detailed.
Prerequisite(s): [(BME 315 and ECE 215)]
(3-0-3)

BME 443
Biomedical Instrumentation & Electronics
Principles of circuit analysis are applied to typical transducer and signal recording situations found in biomedical engineering. Basic electrical and electronic circuit theory is reviewed with an emphasis on biomedical measurement applications. A design project is completed by the student. Open only to Biomedical Engineering majors. Requires junior standing.
Prerequisite(s): [(BME 315)]
(3-0-3)

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. Neural encoding theories are introduced.
Prerequisite(s): [(BME 315)]
(3-0-3)

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)]
(3-0-3)

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)]
(3-0-3)

BME 453
Quantitative Physiology
The primary objective of this course is to introduce students to basic physiological concepts using a quantitative approach. The main systems that control the human body functions will be reviewed to enable the students to understand the individual role of each major functional system as well as the need for the integration or coordination of the activities of the various systems. Attempts will be made to highlight the patho-physiological consequences of defects or failures in the organ systems, and the relevant corrective approaches. This course will include lectures from individuals who have relevant expertise in the different organ systems because of the complexity of the human body.
Corequisite(s): (BME 405)
Prerequisite(s): [(BME 100)]
(3-0-3)

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)]
(3-0-3)

BME 460
Advanced Biomaterials
Continuation of biomaterials applications to tissue and organs. Novel applications of materials to replace living tissues and organs, such as skin, blood vessels, and heart valves will be considered.
Prerequisite(s): [(BME 310)]
(3-0-3)

BME 470
Engineering Biocompatible Materials
Engineering Biocompatible Materials aims to describe synthetic materials that are routinely used as components of various medical devices implanted in the human body. Students will critically examine prosthetic materials used in specific devices. The biological environment relevant to the discussed implant will be reviewed. Problems with current materials will be analyzed. Strategies and techniques required to engineer sophisticated biomaterials for future applications will be developed.
Prerequisite(s): [(BIOL 115 and BIOL 117)]
(3-0-3) **(C)**

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)]
(3-0-3)

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.
Prerequisite(s): [(BME 301 and CHE 202)]
(3-0-3)

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.
(1-0-1) **(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.
(Credit: Variable) **(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.
(Credit: Variable) **(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.
(3-0-3)

BME 497
Special Problems
Design, development, analysis or research on special topics defined by a faculty member or the department.
Prerequisite(s): [(BME 301, BME 335, and MATH 252)]
(0-0-3)

Business

BUS 100
Introduction to the Profession
Introduction to Business as a profession. Topics include the role of business in our society, career opportunities in business, the interface between business and technology, business ethics, and communication skills.
(3-0-3) **(C)(E)**

BUS 205
Business Basics
This course will provide a basic introduction to accounting and marketing principles, two of the core business skills that every entrepreneur, engineer or scientist involved with new product introduction needs. It is intended for engineering, science and architecture students who are not taking a business minor. This course will not count towards a business degree or business minor.
(3-0-3)

BUS 210
Financial & Managerial Accounting
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.
(3-0-3)

BUS 211
Financial Accounting & External Reporting
Introduces the three major financial statements: the Balance Sheet, the Income Statement, and the Statement of Cash Flows. The course emphasizes the difference between cash flows and income. Emphasis is placed on understanding financial statements and the procedures underlying them rather than on the preparation of such statements. Accounting software will be used to facilitate the preparation of statements.
(3-0-3) **(E)**

BUS 212
Managerial Accounting & Control
The sequel to BUS 211, this course concentrates on the uses of accounting information within an enterprise for the following purposes: product costing; short-term and long-term decision-making; budgeting; control of operations; and performance evaluation. The major topical areas covered are cost-volume-profit relationships, relevant costs, cash flow forecasts, flexible budgets, and standard costs.
Prerequisite(s): [(BUS 211)]
(3-0-3)

BUS 221
Statistics for Managerial Decision Making
Introduction to probability concepts; descriptive statistics; probability distributions, (binomial, Poisson, normal and t) and their applications. Statistical inference (confidence intervals, hypothesis testing and sample size determination); simple regression, and correlation.
(3-0-3)

BUS 301
Theory of Organization & Management
Introduction to the theory and practice of management; includes basic managerial functions: planning, organizing, leading, and controlling. Communication, motivation, and decision-making techniques are stressed. Also covered are organization structure and design, the dynamics of individual and group interaction, organization climate, managerial styles, the implication of increasing work force diversity, coping with conflict, and methods for achieving organizational improvement. Issues in international business are dealt with at relevant points.
(3-0-3) **(C)(E)**

BUS 305
Operations Management
Operational problems studied from a systems viewpoint. Development and application of policies, techniques, and models for making decisions in the areas of product and service design, design of operating systems, production, and control of the product or service.
(3-0-3)

BUS 311
Strategic Cost Management
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 212, BUS 221, and BUS 351*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

BUS 321
Management Science
Introduction to the use of mathematical models in the solution of business problems. Linear programming, Network analysis, and simulation, Analysis of waiting lines.
(3-0-3)

BUS 341
Introduction to Business Law
Legal implications of business transactions are studied. Specific topics include: the nature of law and its place in society, especially in relation to business; contracts and property law studied by the case method; formation and operation of contracts; their significance to the economic order.
(3-0-3) **(C)(E)**

BUS 351
Financial Management & Decision Making
Provides an introduction to financial management principles that are useful for individuals as well as firms. The three major areas covered are: capital budgeting; capital structure; and the management of working capital. Time will be spent on understanding discounted cash flow methods, valuing debt and equity securities, the capital asset pricing model, risk and return tradeoffs, equity versus debt tradeoffs, and derivative securities.
Corequisite(s): (BUS 212)
(3-0-3)

BUS 361
Introduction to Entrepreneurship
The course will examine how social, psychological, and economic factors influence and shape entrepreneurship and new venture formation. Students will explore the impact of entrepreneurship and new venture formation on society. This includes an investigation into the contributions that entrepreneurs make to both social and economic systems. Insights into what it is like to work in an entrepreneurial organization including the dynamics and challenges associated with new venture formation and start-up are investigated. The characteristics and attributes of successful entrepreneurial companies will be discussed. This includes comparing and contrasting the similarities and differences between entrepreneurial led small and medium enterprises (SMEs),closely held and family businesses, and public corporations.
(3-0-3) **(C)(E)**

BUS 362
Entrepreneurship & New Venture Formation
This course is a first introduction to fundamentals of technology entrepreneurship. It will explore the factors that influence entrepreneurial activity as well as the effects of entrepreneurship on society. Technology entrepreneurship involves identifying high- potential technology-intensive commercial opportunities, gathering resources and capital, and managing rapid growth and significant risks using principled decision-making skills. The course introduces students to the skills necessary to successfully identify a true business opportunity, and to start, grow and maintain a technology based enterprise. This course is designed for all majors except for business, particularly science, engineering, and architecture students.
(3-0-3)

BUS 363
Creativity & Inventions for Entrepreneurs
Students learn to brainstorm for patentable, feasible ideas and then put them through the initial development stages, including: project workup, patent searches, prototyping, market research, design interaction, and financial projections. The course involves frequent presentations and reports, including: first prototype, second prototype, project proposal, patent description and claims, and business plans.
(3-0-3) **(C)(E)**

BUS 371
Introduction to Marketing
Introduction to the activities and decisions faced by marketing managers in modern organizations. Topics include: consumer and organizational buying behavior, marketing research, market segmentation, new product development, product line decisions, pricing channels, distribution, promotion, international marketing, and introduction to marketing strategic planning.
(3-0-3) **(C)(E)**

BUS 381
Understanding Cultures
This course will familiarize and sensitize students to issues of intercultural perception and communication, with particular attention to interaction within the business world and among professionals in different fields. It provides a context for understanding cultural differences and different taken-for-granted assumptions about proper behavior and the social world. The course has both theoretical and practical aspects. Individual and group tasks include analysis, observation and interviewing, role- playing, papers, and presentations. The course systematically examines important cultural aspects ant their variation across a broad cultural spectrum and brings in occasional guest lecturers with international business and professional experience.
(3-0-3) **(C)**

BUS 400
Business Seminar
A series of speakers will be brought in to broaden the perspective of Business majors.
(2-0-1)

BUS 402
Leadership Seminar
This course is designed to help students: Understand the nature of leadership in terms of the traits and behaviors that define effective leadership. Practice and develop leadership behaviors through a series of simulations or hands on exercises. Gain feedback regarding their individual leadership strengths and development opportunities. Design a personal development plan to continue to enhance leadership skills outside of this class.
(2-0-1) **(E)**

BUS 423
Management Information Systems
Application of information systems to business strategy and performance, includes functional capabilities of hardware and software, system development and successful implementation, case studies, and software exercises.
Prerequisite(s): [(BUS 321)] AND [(CS 105) OR (CS 115) OR (CS 201)]
(3-0-3)

BUS 441
Employee Rights & Legal Protections
This course will focus primarily on the principal policies governing the individual employment relationship, examine the development of the employment contract and protectable legal interests in the employment relationship. Employment handbooks and policy manuals including Best Practices in drafting lawful policies and procedures and maintaining personnel records will be addressed. Hiring, firing, disciplining, and investigating employee complaints will be analyzed. Specific attention will be also given to regulation of pay and hours, recent Whistle Blower laws alternative dispute resolution procedures.
Prerequisite(s): [(BUS 341)]
(3-0-3) **(E)**

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)]
(3-0-3)

BUS 454
Valuation & Portfolio Management
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)]
(3-0-3)

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)]
(3-0-3)

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)]
(3-0-3)

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)]
(3-0-3)

BUS 458
Futures Options & OTC 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) OR (BUS 321) OR (BUS 351)]
(3-0-3)

BUS 462
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)]
(3-0-3) **(C)**

BUS 465
Entrepreneurship in Industry
This course places emphasis on the role of entrepreneurship and innovation in existing manufacturing companies, as well as exploring how to recognize, screen, and bring to market new manufacturing and industrial opportunities. Manufacturing for the purposes of this course considers all activities that combine labor, technology, and materials to produce products of greater value. This includes engineered products, food, pharmaceuticals, and chemicals to name a few. Topics covered in this course include opportunity recognition and new venture formation, building competitive advantage, managing technology and innovation, marketing and sales, management of operations, and financing for growth.
(3-0-3)

BUS 466
Entrepreneurship in Science & Technology
This course introduces the fundamentals of science and technology entrepreneurship. Science and technology entrepreneurship, in itself, is a spirited approach to business leadership that involves identifying high-potential, science and technology- intensive commercial opportunities, gathering resources and capital, and managing rapid growth and significant risks using principled decision-making skills. This course is designed for graduate students in all majors, particularly science, engineering, and design students. Topics introduced in this course are not only relevant to future entrepreneurs, but also to future engineers and scientists in industry. This course introduces the student to the basic tools necessary to successfully identify a true business opportunity, and to start, grow, and maintain a science and technology enterprise.
(3-0-3)

BUS 467
Growth Strategies for Emerging Enterprises
This course offers practical management tools that are needed to build a new venture into a significant enterprise. The competencies, strategies and structures of successful high performance businesses are studied through cases, videos and guest lecturers. Topics include leadership, internal growth strategies, merger, acquisition and franchising.
(3-0-3)

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)]
(3-0-3) **(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)]
(3-0-3) **(C)(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)]
(3-0-3)

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)]
(3-0-3)

BUS 480
Business Strategy
This course is the integration and application of the knowledge and skills learned in the foundation, tools and concepts, and functional field component of the undergraduate management core. Requires senior standing.
(3-0-3) **(C)(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.
(Credit: Variable)

Civil, Architectural, and Environmental Engineering

CAE 100
Introduction to Engineering Drawing & Design
Introduction to engineering graphics as a problem-solving tool. Basic traditional techniques of orthographic projection, multi-view, pictorial, auxiliary views, dimensioning, sectioning, detail drawing. Use of ANSI standards; applications in civil and architectural engineering.
(1-2-2) **(C)**

CAE 101
Introduction to AutoCAD Drawing & 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)]
(0-4-2) **(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, transits, total stations and photogrammetric equipment.
Prerequisite(s): [(CAE 100*)] An asterisk (*) designates a course which may be taken concurrently.
(2-2-3)

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."
(0-1-1)

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."
(0-1-1)

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, CS 105, MATH 251*, and PHYS 123)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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): [(CAE 208, MATH 252*, and PHYS 224*)] An asterisk (*) designates a course which may be taken concurrently.
(4-0-4)

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.
(2-2-3)

CAE 301
Hydraulics & Hydrology
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.
(2-3-3)

CAE 302
Fluid Mechanics & 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)]
(3-0-3)

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)]
(3-0-3) **(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)]
(2-2-3)

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 304 and CAE 315)]
(2-3-3) **(C)(D)**

CAE 310
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)]
(2-3-3)

CAE 312
Engineering Systems Analysis
Applications of engineering and economic concepts and analysis to civil engineering systems; practical applications of elementary probability and statistics, operations research and economics in civil engineering.
Prerequisite(s): [(MATH 251)]
(3-0-3) **(C)**

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)]
(2-3-3) **(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): [(MMAE 202)] AND [(CAE 209) OR (CAE 301) OR (CAE 302)]
(2-3-3) **(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.
Prerequisite(s): [(CAE 209) OR (CHE 302) OR (MMAE 322)]
(3-0-3)

CAE 334
Illumination & Acoustics
General introduction to the aural and visual environment. Subjective and objective scales of measurement. Laws of psychophysics. Introduction to vibration. The hearing mechanism. Transfer of sound. Passive control of noise in buildings, transmission loss. Absorption and reverberation time. Active control of the aural environment. Visual perception. Photometry, brightness, luminance and illumination. Natural lighting of buildings. Artificial lighting.
Prerequisite(s): [(MATH 152)] AND [(PHYS 200) OR (PHYS 221)]
(3-0-3)

CAE 383
Electrical & 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. Course does not satisfy graduation requirements for Computer Engineering or Electrical Engineering majors.
Prerequisite(s): [(MATH 252 and PHYS 221)]
(3-0-3)

CAE 403
Sound & Vibration Control in Buildings
Basic sound physics and sound propagation in enclosed spaces. Sound and vibration sources in and out of buildings. Theories of sound transmission through building elements. Effects of noise and vibration on man and buildings, criteria and standards. Design of noise control systems. Calculation of airborne and impact sound insulation. Noise and vibration control implementations in various indoor spaces, such as residential units, offices, schools and mechanical rooms.
Prerequisite(s): [(CAE 334)]
(2-1-3)

CAE 408
Bridge & 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.
(3-0-3) **(D)**

CAE 409
Analysis & Design of Acoustic Perfomance Spaces
This course will discuss the design of acoustic spaces such as conference rooms, classrooms, lecture halls, music halls, theater, churches, recording studio, and home theater. Course covers the selection and determination of appropriate steady state, spatial, and temporal acoustic measures such as background noise levels, reverberation time, speech transmission index, and interaural cross correlation, as well as the selection of building materials and layout of rooms to meet those requirements.
Prerequisite(s): [(CAE 334) OR (CAE 403)]
(3-0-3)

CAE 410
Introduction to Wind & 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.
Prerequisite(s): [(CAE 310)]
(3-0-3)

CAE 412
Traffic Engineering Studies & 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. Requires senior standing.
(3-0-3) **(D)**

CAE 415
Pavement Design, Construction & 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)]
(3-3-4)

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. Requires senior standing.
(3-0-3) **(D)**

CAE 417
Railroad Engineering 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. Requires junior standing.
(3-0-3) **(C)(D)**

CAE 419
Transportation Engineering & 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. Requires junior standing.
(3-0-3) **(D)**

CAE 420
Dynamics of Structures
Fundamentals of free, forced, and transient vibration of single and multi-degree of freedom structures, including damping of lumped and distributed parameters systems. Time, frequency and approximate methods of analysis. Application of numerical methods in time and frequency domain. Response spectra, normal modes, coupling and normal coordinates, and an introduction to earthquake engineering.
Prerequisite(s): [(CAE 310 and MMAE 305)]
(3-0-3)

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.
(3-0-3)

CAE 425
Fire Protection & 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.
(3-0-3)

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)]
(3-0-3) **(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, CAE 310, and CAE 315)]
(3-0-3) **(D)**

CAE 432
Concrete & Foundation Design
Design of reinforced concrete building frames and continuous structures. Design of girders, slabs, columns, foundations, and retaining walls.
Prerequisite(s): [(CAE 307, CAE 310, and CAE 315)]
(3-0-3) **(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 431 and CAE 432)]
(3-0-3)

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 310) OR (CAE 351 and CAE 352)]
(2-2-3)

CAE 436
Design of Masonry & 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.
Prerequisite(s): [(CAE 307 and CAE 310) OR (CAE 352)]
(3-0-3) **(D)**

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.
(3-0-3)

CAE 442
Finite Element Methods in Framed Structures
Basic principles and review of elasticity, energy methods, stiffness method, element stiffness matrix, finite elements applications in frames, trusses, curved and non-prismatic and plate structures, convergence of finite element models, practical problems.
Prerequisite(s): [(CAE 310)]
(3-0-3)

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 301 and CAE 323)]
(3-0-3) **(D)**

CAE 461
Plumbing & 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 209) OR (CAE 302) OR (MMAE 310)]
(3-0-3) **(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)]
(3-0-3) **(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 531) OR (MMAE 322)]
(3-0-3) **(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)]
(3-0-3) **(D)**

CAE 466
Building Electrical 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, panelboards, 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 213)]
(3-0-3)

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.
Prerequisite(s): [(CAE 334)]
(3-0-3)

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, Design Approach, and Architectural Presentation Techniques taught through lecture and lab instruction.
Prerequisite(s): [(CAE 331 and CAE 334)]
(2-1-2)

CAE 469
Architectural Studio
Architectural Studio is the second 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, Design Approach, and Architectural Presentation Techniques taught through Studio instruction.
Prerequisite(s): [(CAE 468)]
(0-4-2)

CAE 470
Construction Methods & 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. Requires senior standing.
(2-3-3) **(D)**

CAE 471
Construction Planning & 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. Requires senior standing.
Prerequisite(s): [(CAE 470)]
(3-0-3) **(C)(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. Requires senior standing.
(3-0-3)

CAE 473
Construction Contract Administration
Characteristics of the construction industry. Project delivery systems. Duties and liabilities of the parties at the precontract 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. Requires senior standing.
(3-0-3)

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.
Prerequisite(s): [(CAE 301)]
(3-0-3) **(D)**

CAE 486
Soil & 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)]
(3-0-3)

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 497
Special Project
Special design project under individual supervision of instructor. Prerequisite: Senior standing, minimum GPA of 3.0, and consent of instructor.
(Credit: Variable)

Chemical Engineering

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.
(1-2-2) **(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)]
(1-2-2) **(C)**

CHE 202
Material Energy Balances
Material and energy balances for engineering systems subjected to chemical and physical transformations. Calculations on industrial processes. Open only to Biomedical Engineering or Chemical Engineering majors.
Prerequisite(s): [(One semester of chemistry and MATH 152)] AND [(CS 105) OR (CS 115)]
(3-0-3) **(C)**

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. Open only to Chemical Engineering majors.
Prerequisite(s): [(CHE 101 and CHE 202)]
(0-2-1) **(C)**

CHE 301
Fluid Mechanics
Flow of fluids. Fundamentals of fluid flow design equations as applied to selected unit operations.
Prerequisite(s): [(CHE 202 and MATH 252)]
(3-0-3)

CHE 302
Heat & 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)]
(3-0-3)

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)]
(3-0-3)

CHE 317
Chemical & 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)]
(1-3-2) **(C)**

CHE 351
Thermodynamics I
Laws of thermodynamics and their application to chemical engineering operations.
Prerequisite(s): [(CHE 202 and CHEM 343)]
(3-0-3)

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, CHE 302, and MATH 252)]
(3-0-3)

CHE 412
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)]
(3-0-3)

CHE 418
Chemical & Biological Engineering Laboratory II
Laboratory work in distillation, humidification, drying, gas absorption, filtration, and other areas.
Prerequisite(s): [(CHE 302 and CHE 317)]
(1-3-2) **(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, CHE 351, and CHE 433)]
(3-0-3)

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. Requires junior standing.
Prerequisite(s): [(MATH 151)]
(3-0-3)

CHE 430
Petrochemical Process Operations & Design
Chemical and engineering aspects of current petrochemical and petroleum refining processes will be emphasized, including chemical conversions (catalytic and thermal), physical separations, and evaluation of alternatives. Design and simulation of refinery separation systems with emphasis on distillation columns.
Prerequisite(s): [(CHE 494)]
(3-0-3)

CHE 433
Process Modeling & 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)]
(3-0-3)

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)]
(3-0-3)

CHE 439
Numerical & 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.
Prerequisite(s): [(MATH 252)] AND [(CHE 406*, CHE 423, and CHE 435)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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)]
(3-0-3)

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 301 and CHE 302)]
(3-0-3)

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)]
(3-0-3)

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 spatil non-uniformities in stacks, and balance of plant design.
Prerequisite(s): [(CHE 423)]
(3-0-3)

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, MATH 251, and PHYS 221)]
(3-0-3)

CHE 475
Food Engineering I
Fundamentals of food engineering. Theory and practice in food processing operations including material and energy balances, flow of fluid foods, heat transfer, thermal process evaluation, and evaporation. Problem-solving and calculation sessions.
Prerequisite(s): [(CHE 202, CHE 301, and CHE 302)]
(3-0-3)

CHE 476
Food Engineering II
Companion course to CHE 475 and normally follows it. Covers freezing and thawing, dehydration (including freeze-drying), distillation, and extraction.
Prerequisite(s): [(CHE 202, CHE 301, and CHE 302)]
(3-0-3)

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)]
(3-0-3)

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
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 302, CHE 423*, CHE 433, CHE 435*, and CHE 451)] An asterisk (*) designates a course which may be taken concurrently.
(2-2-3) **(C)**

CHE 496
Design IPRO
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. Only CHE students should register for this course. Same as IPRO 496. Open only to Chemical Engineering majors.
Prerequisite(s): [(CHE 296, CHE 423*, CHE 435*, and CHE 494)] An asterisk (*) designates a course which may be taken concurrently.
(1-2-2) **(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)]
(3-0-3)

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

CHE 503
Thermodynamics

CHE 505
Fluid Properties

CHE 506
Entrepreneurship and Intellectual Property Management

CHE 508
Process Design Optimization

CHE 510
Fluid Dynamics

CHE 511
Regulatory Issues in Pharmaceutical Processes

CHE 512
Heat Transfer

CHE 514
Process Analytical Technology

CHE 515
Natural Gas Processing

CHE 518
Mass Transfer

CHE 519
Biosensors

CHE 522
Fundamentals of Combustion

CHE 524
Industrial Catalysis

CHE 525
Chemical Reaction Engineering

CHE 530
Advanced Process Control

CHE 533
Statistical Analysis of Systems

CHE 535
Applications of Mathematics to Chemical Engineering

CHE 536
Computational Techniques in Engineering

CHE 538
Polymerization Reaction Engineering

CHE 541
Renewable Energy Technologies

CHE 542
Fluidization and Gas-Solids Flow Systems

CHE 543
Energy, Environment, and Economics

CHE 545
Metabolic Engineering

CHE 551
Advanced Transport Phenomena

CHE 553
Advanced Thermodynamics

CHE 555
Polymer Processing

CHE 560
Statistical Quality and Process Control

CHE 565
Fundamentals of Electrochemistry

CHE 566
Electrochemical Engineering

CHE 573
Bioseparations

CHE 575
Polymer Rheology

CHE 577
Bioprocess Engineering

CHE 580
Biomaterials

CHE 582
Interfacial and Colloidal Phenomena with Applications

CHE 583
Pharmaceutical Engineering

CHE 584
Tissue Engineering

CHE 585
Drug Delivery

CHE 586
Particulate Technology

Chemistry

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.
(2-0-2) **(C)**

CHEM 122
Principles of Chemistry I Without Laboratory
Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermo chemistry, properties of gases, states of matter, chemical solutions, kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding. Same as CHEM 124 except without the laboratory.
(3-0-3)

CHEM 123
General Chemistry Laboratory
General chemistry laboratory. The laboratory portion of CHEM 124.
(0-3-1)

CHEM 124
Principles of Chemistry I with Laboratory
Foundations of chemistry, atoms and molecules, stoichiometry of chemical reactions, thermo chemistry, properties of gases, states of matter, chemical solutions, kinetics. Molecular basis for chemical reactivity; atomic structure, periodicity, chemical bonding.
(3-1-4) **(C)**

CHEM 125
Principles of Chemistry II
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 124) OR (IIT Chemistry Placement: 125)]
(3-3-4) **(C)**

CHEM 126
Principles of Chemistry II
Same as CHEM 125 except without the laboratory.
Prerequisite(s): [(CHEM 122) OR (CHEM 124)]
(3-0-3)

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)]
(0-3-1)

CHEM 235
Organic Chemistry I-Lecture
The constitution and properties of the different classes of organic compounds, with considerable attention to stereochemistry, reaction mechanisms, synthetic organic and bio-organic chemistry, and spectroscopy. The laboratory work involves an introduction to major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds and the isolation of compounds from natural sources. Lecture only.
Prerequisite(s): [(CHEM 125) OR (CHEM 126)]
(3-0-3)

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)]
(0-4-1)

CHEM 237
Organic Chemistry I
The constitution and properties of the different classes of organic compounds, with considerable attention to stereochemistry, reaction mechanisms, synthetic organic and bio-organic chemistry, and spectroscopy. The laboratory work involves an introduction to the major synthetic and analytical techniques of organic chemistry including the preparation of representative organic compounds and the isolation of compounds from natural sources.
Prerequisite(s): [(CHEM 125) OR (CHEM 126)]
(3-4-4) **(C)**

CHEM 239
Organic Chemistry II
Sequel to Organic Chemistry I. Constitution and properties of organic compounds at a fundamental level. Introduction to biological materials and synthetic polymers.
Prerequisite(s): [(CHEM 235 and CHEM 236) OR (CHEM 237)]
(3-0-3)

CHEM 240
Organic Chemistry Laboratory
Laboratory part of CHEM 239. Techniques for advanced organic preparations. Identification and characterization of organic compounds, including modern instrumental methods.
Prerequisite(s): [(CHEM 239*)] An asterisk (*) designates a course which may be taken concurrently.
(1-4-2) **(C)**

CHEM 247
Analytical Chemistry
Introduction to the theory and applications of analytical chemistry. Laboratory emphasis on obtaining and interpreting quantitative data. Statistical data analysis, equilibrium expressions, pH, volumetric and gravimetric analysis, fundamentals of spectroscopy, fundamentals of electrochemistry, and analytical separations. Laboratory experiments include acid-base behavior, potentiometry with ion-specific electrodes, spectroscopy (UV-visible and atomic absorption), and chromatography (ion-exchange, high pressure liquid, and gas-liquid).
Prerequisite(s): [(CHEM 125)]
(2-4-3) **(C)**

CHEM 321
Instrumental Analysis
Theory and application of modern instruments in chemical procedures. Standard spectroscopic methods including Fourier transform infrared spectroscopy, nuclear magnetic resonance spectroscopy and ultraviolet spectroscopy. Separation techniques using high pressure liquid chromatography and gas chromatography. Other topics relevant to advanced chemical instrumentation will also be covered.
Prerequisite(s): [(CHEM 247)]
(2-6-4) **(C)**

CHEM 334
Spectroscopic Methods in Identification & 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.
Prerequisite(s): [(CHEM 239 and CHEM 247)]
(2-0-2)

CHEM 335
Spectroscopic & Separation Techniques
Characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods.
Prerequisite(s): [(CHEM 240, CHEM 247, and CHEM 334*)] An asterisk (*) designates a course which may be taken concurrently.
(0-6-2) **(C)**

CHEM 343
Physical Chemistry I
Equations of state; kinetic molecular theory; temperature dependent enthalpies and heat capacities of chemical compounds and of chemical reactions; entropy and the Gibbs free energy; chemical equilibrium; phases with variable composition; solutions of charged particles; surface phenomena.
Prerequisite(s): [(MATH 251) OR (MATH 252)]
(3-0-3)

CHEM 344
Physical Chemistry II
Quantum theory, molecular structure and spectroscopy, chemical equilibrium constants from statistical mechanics, phenomenological and mechanistic chemical reaction kinetics, transport phenomena from molecular perspective. The laboratory will include experiments dealing with gases, thermo chemistry, liquid solutions, phase equilibria, electrochemistry, chemical kinetics, spectra, molecular structure, and treatment of data.
Prerequisite(s): [(CHEM 343 and PHYS 221)] AND [(CHE 202) OR (CHEM 247)]
(3-4-4) **(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)]
(2-2-3)

CHEM 415
Inorganic Chemistry
In-depth introduction to the vast subfield of the discipline dealing with all field 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)]
(3-0-3)

CHEM 416
Advanced Chemistry Laboratory
An advanced laboratory with emphasis on synthesis and characterization of inorganic and organometallic compounds.
Prerequisite(s): [(CHEM 240 and CHEM 415)]
(1-7-3) **(C)**

CHEM 434
Spectroscopic Methods in Identification & 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 240 and CHEM 247)]
(3-4-4)

CHEM 450
Introduction to Research
Required for chemistry majors. Designed to give research experience in a faculty research laboratory.
(0-8-3) **(C)**

CHEM 451
Modern Techniques in Chemical Literature
A guide to the use of traditional and automated methods for the storage and retrieval of chemical information.
(3-0-3)

CHEM 454
Computer Applications in Chemistry
A numerical methods and computer applications course for chemists; emphasis on software rather than hardware; results of numerical analysis and linear algebra presented and applied to solution of chemical problems.
Prerequisite(s): [(CHEM 344, CS 105, and MATH 152)]
(3-0-3)

CHEM 455
Advanced Organic Chemistry
A survey of organic name reactions and modern reagents for organic synthesis with an emphasis on their utility in multistep synthesis.
Prerequisite(s): [(CHEM 239 and CHEM 344)]
(3-0-3)

CHEM 470
Introduction to Polymers
Basic introduction to Polymer Science. The course will cover basics of polymer nomenclature, synthesis, characterization, and the relationship between polymer structures and properties. Examples of major applications of polymeric materials including biopolymers will be presented.
Prerequisite(s): [(CHEM 239)]
(3-0-3)

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.
(1-0-1)

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 and CHEM 451)]
(0-12-4) **(C)**

CHEM 497
Special Projects
For juniors and seniors. Requires junior standing.
(Credit: Variable) **(C)**

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

CHEM 500
Advanced Analytical Chemistry

CHEM 502
Gas Chromatography

CHEM 504
Electroanalytical Chemistry

CHEM 505
Spectroscopic Methods

CHEM 506
Sampling and Sample Preparation

CHEM 508
Analytical Methods Development

CHEM 509
Physical Methods of Characterization

CHEM 510
Electronics and Interfacing

CHEM 518
Electrochemical Methods

CHEM 520
Advanced Inorganic Chemistry

CHEM 521
Structural Inorganic and Solid-State Chemistry

CHEM 522
Efficienct Chemical and Materials Synthesis

CHEM 524
Synthesis and Intellectual Property Management

CHEM 530
Organic Reaction Mechanisms

CHEM 531
Tactics in Organic Synthesis

CHEM 535
Polymer Synthesis

CHEM 537
Polymer Chemistry Laboratory

CHEM 538
Physical Biochemistry

CHEM 539
Introduction to Pharmaceutical Chemistry

CHEM 542
Polymer Characterization

CHEM 550
Chemical Bonding

CHEM 552
Chemical Kinetics

CHEM 553
Introduction to Chemical Thermodynamics

Communication

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.
(3-0-3) **(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.
(3-0-3) **(C)**

COM 125
Language & 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.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

COM 126
Language & 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.
Prerequisite(s): [(COM 125)] AND Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

COM 372
Mass Media & 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)]
(3-0-3) **(C)(H)**

COM 377
Communication Law & 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)]
(3-0-3) **(C)(H)**

COM 380
Topics 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)]
(3-0-3) **(C)(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
(3-0-3) **(C)**

COM 401
Advanced Composition & 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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(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
(3-0-3) **(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.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(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
(3-0-3) **(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)]
(3-0-3) **(C)**

COM 428
Verbal & 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
(3-0-3) **(C)**

COM 430
Introduction to Web Design & 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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)**

COM 431
Intermediate Web Design & Management
A continuation of COM 430, this course goes more deeply into HTML, multimedia, and some of the advanced features of WYSIWYG editors.
Prerequisite(s): [(COM 430)] AND Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)**

COM 432
Advanced Web Design & Management
A continuation of COM 430 and COM 431, this course covers the most current Web technologies.
Prerequisite(s): [(COM 431)] AND Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(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)]
(3-0-3) **(C)(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.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(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.
Prerequisite(s): Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(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)]
(3-0-3) **(C)(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 & 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) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(H)**

City and Regional Planning

CRP 201
The Dwelling
Programming and planning for human habitation in dwellings and neighborhoods. Housing as a response to human needs. Environmental impacts and their amelioration. Building types and their impacts on programmatic needs. Examples of various housing schemes in and around Chicago.
(3-0-3)

CRP 203
Housing & Housing Types
The planning of rooms, houses, and groups of houses. Analysis of climatological, physical, psychological, and social needs and their influence on the planning of housing. Government regulations, costs and financing and their impact on housing. Includes single-family detached, row housing, walk ups, and low-rise construction. Limited work in other buildings. Lectures, seminars, and drawing problems. Prerequisite: Drawing ability.
(1-4-3)

CRP 425
History & Architecture of Cities I
Selected topics in the history and development of human settlements. Examination of the forces affecting city development in history. These courses are taught as seminars and meet for one three-hour period per week.
(3-0-3)

CRP 426
History & Architecture of Cities II
Selected topics in the history and development of human settlements. Examination of the forces affecting city development in history. These courses are taught as seminars and meet for one three-hour period per week.
(3-0-3)

CRP 465
The Ecological Basis of Planning
The role of natural systems in meeting human needs. Natural systems. Climate, geology, land forms, soils, vegetation, and animal populations as the bases of agricultural and industrial technologies. Competing demands on air, water, and land. Limiting factors.
(3-0-3)

CRP 470
Urban Form in History: Pre-20th Century
This course studies the historical and modern urban form in relation to contemporary urban problems. In the first semester historical examples of high density urban form and housing are selected and analyzed. Many examples of innovative urbanism and housing have features that are relevant to modern problems. They can be found in the different historical periods of major world regions, cultures, and climates. Each student will take two or more examples and will prepare a report with text, diagrams, and data. Requires senior standing.
(2-2-3) **(C)**

CRP 472
Low-Rise Urbanism: House Components, Form/Cluster Design
As low-density suburbs expand so do the problems of environmental quality, land use, traffic, pollution, etc. The alternative model of high-density, low-rise, energy efficient urbanism is the subject of this course. The first semester deals with the components of the house and their assembly into unit form, the guiding principles of unit aggregation, solar orientation, gardens, access and garaging. Each student will prepare designs for unit types and diagrammatic clustering.
(2-8-6)

CRP 497
Special Problems
Independent study of projects and problems.
(Credit: Variable)

Computer Science

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.
(1-2-2) **(C)**

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. Course does not satisfy graduation requirements for Computer Information Systems, Computer Engineering, Computer Science or Electrical Engineering majors.
(2-1-2)

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.
(2-1-2)

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)]
(2-1-2)

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 105) OR (CS 115 with min. grade of D)]
(3-2-4)

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 116) OR (CS 201)]
(3-1-3)

CS 331
Data Structures & 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)]
(3-1-3)

CS 350
Computer Organization & 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.
(3-1-3) **(C)**

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)]
(3-1-3)

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)]
(3-0-3) **(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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 330 and CS 331) OR (CS 331 and MATH 230) OR (CS 401) OR (CS 403)]
(3-1-3) **(C)(T)**

CS 440
Programming Languages & 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 (CS 331 and MATH 230) OR (CS 401) OR (CS 403)]
(3-0-3) **(T)**

CS 441
Current Topics in Programming Languages
New topics in programming language design such as concepts of concurrent and distributed programming, communicating sequential processes, and functional programming. System development tools and language features for programming. Introduction to programming language semantics.
Prerequisite(s): [(CS 331) OR (CS 401) OR (CS 403)]
(3-0-3) **(T)**

CS 445
Object Oriented Design & 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)]
(3-0-3) **(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.
Prerequisite(s): [(CS 445)]
(3-0-3) **(C)(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)]
(3-0-3) **(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)]
(3-0-3) **(T)**

CS 456
Introduction to Wireless Networks & 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 (CS 401 and CS 402) OR (CS 403) OR (ECE 242)]
(3-0-3) **(T)**

CS 458
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 and CS 450)]
(3-0-3) **(C)(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 and ECE 218) OR (ECE 218 and ECE 242)]
(2-2-3) **(C)(T)**

CS 480
Artificial Intelligence Planning & Control
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) OR (CS 401) OR (CS 403)] AND [(MATH 474*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(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)]
(3-0-3) **(T)**

CS 482
Information & 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 422, CS 425, and CS 429) OR (CS 422, CS 425, and CS 481) OR (CS 425, CS 429, and CS 481)]
(3-0-3) **(C)(T)**

CS 485
Computers & 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 428)]
(3-0-3) **(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)]
(3-0-3) **(C)(T)**

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)

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

CS 511
Topics in Computer Graphics

CS 512
Topics in Computer Vision

CS 520
Database Design and Engineering

CS 521
Object-Oriented Analysis and Design

CS 522
Data Mining

CS 525
Advanced Database Organization

CS 529
Information Retrieval

CS 530
Theory of Computation

CS 531
Topics in Automata Theory

CS 532
Formal Languages

CS 533
Computational Geometry

CS 535
Design and Analysis of Algorithms

CS 536
Science of Programming

CS 537
Software Metrics

CS 538
Combinatorial Optimization

CS 540
Syntactic Analysis of Programming Languages

CS 541
Topics in Compiler Construction

CS 542
Computer Networks I Fundamentals

CS 544
Computer Networks II: Network Services

CS 545
Distributed Computing Landscape

CS 546
Parallel and Distributed Processing

CS 547
Wireless Networking

CS 548
Broadband Networks

CS 549
Cryptography and Network Security

CS 550
Advanced Operating Systems

CS 551
Operating System Design and Implementation

CS 552
Distributed Real-Time Systems

CS 553
Pervasive Computing

CS 555
Analytic Models and Simulation of Computer Systems

CS 560
Computer Science in the Classroom

CS 561
The Computer and Curriculum Content

CS 570
Advanced Computer Architecture

CS 580
Medical Informatics

CS 581
Topics in Artificial Intelligence

CS 582
Computational Robotics

CS 583
Expert Systems

CS 584
Machine Learning

CS 585
Natural Language Process

CS 586
Software Systems Architectures

CS 587
Software Project Management

CS 588
Advanced Software Engineering Development

CS 589
Software Testing and Analysis

CS 595
Topics in Computer Science

Electrical and Computer Engineering

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.
(2-3-3) **(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): [(ECE 218* and MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)**

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)]
(3-3-4) **(C)**

ECE 215
Circuit Analysis I
Ohm's Law, Kirchoff'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 Laplace Transforms. Note: ECE 215 is for non-ECE majors. Course does not satisfy graduation requirements for Computer Engineering, Electrical and Computer Engineering or Electrical Engineering majors.
Prerequisite(s): [(MATH 252*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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. Course does not satisfy graduation requirements for Computer Engineering, Electrical and Computer Engineering or Electrical Engineering majors.
Prerequisite(s): [(ECE 211 with min. grade of C) OR (ECE 215 with min. grade of C)]
(3-0-3)

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. Concurrent registration in ECE 211 and ECE 212 is strongly encouraged. Requires sophomore standing.
(3-0-3)

ECE 242
Digital Computers & 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)]
(3-0-3)

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, MATH 251, and PHYS 221)]
(4-0-4)

ECE 308
Signals & 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): [(ECE 213 and MATH 333*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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)]
(3-3-4) **(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)]
(3-3-4) **(C)**

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-Siedel 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)]
(3-3-4) **(C)**

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. Credit will be given for either ECE 401 or ECE 409, but not for both.
Prerequisite(s): [(ECE 307, ECE 312, and ECE 403*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(P)**

ECE 403
Digital & 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 and MATH 474)]
(3-0-3) **(P)**

ECE 405
Digital & 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* and MATH 474)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)(P)**

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. Requires senior standing.
(3-3-4) **(C)(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. Requires senior standing.
(3-0-3) **(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)]
(3-3-4) **(C)(P)**

ECE 412
Electric Motor 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)]
(3-3-4) **(C)(P)**

ECE 415
Solid-State Electronics

Comprehensive introduction to the basic concepts of Solid State Physics as applied to electronic devices, including heat and charge transport and electron spin effects in materials such as Silicon, Gallium Arsenide, and Gallium Nitride. The electronic structure of crystalline solids is described, as well as their phonon spectra. Carrier dynamics is discussed in detail by emphasizing the importance of the Boltzmann transport equation for both electrons and phonons. Spin transport in semiconductors will be introduced as well. Credit will be given for either ECE 415 or PHYS 415, but not for both.
Prerequisite(s): [(ECE 307) OR (PHYS 348)]
(3-0-3) **(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 reivewed including fast/relay coordination. Finally, power quality and reliability issues are addressed.
Prerequisite(s): [(ECE 319)]
(3-0-3) **(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)]
(3-0-3) **(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)]
(3-3-4) **(C)(P)**

ECE 420
Analytical Methods in Power Systems
Fundamentals of power systems operation and planning. Economic operation of power systems with consideration of transmission losses. Design of reliable power systems, power systems security analysis, optimal scheduling of power generation, estimation of power system state.
Prerequisite(s): [(ECE 319)]
(3-0-3) **(P)**

ECE 421
Microwave Circuits & 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)]
(3-0-3) **(P)**

ECE 423
Microwave Circuits & 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)]
(3-3-4) **(C)(P)**

ECE 425
Analysis & 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.
Prerequisite(s): [(ECE 312)]
(3-0-3) **(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)]
(3-3-4) **(C)(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): [(BME 330) OR (ECE 308)]
(3-3-4) **(C)(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): [(BME 330) OR (ECE 308)]
(3-0-3) **(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)]
(3-0-3) **(P)**

ECE 441
Microcomputers
Microprocessors and stored program controllers. Memories. Standard and special interfaces. Hardware design. Software development. Interrupt systems. Hardware and software design tools. System design and troubleshooting. Emphasis on examples.
Prerequisite(s): [(CS 470) OR (ECE 218)] AND [(CS 350) OR (ECE 242)]
(3-3-4) **(C)(P)**

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)]
(3-3-4) **(C)(P)**

ECE 449
Object-Oriented Programming & Computer Simulation
The use of object-oriented programming to develop computer simulations of engineering problems. Programming with the C++ language in a UNIX environment. OOP concepts including classes, inheritance, and polymorphism. Programming with classes, inheritance, and polymorphism. Programming with class libraries. Event-driven simulation techniques in an object-oriented environment. Programming projects will include the development of a simulator for an engineering application.
Prerequisite(s): [(CS 116 and CS 350) OR (CS 116 and ECE 242)]
(3-0-3) **(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 474*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(P)**

ECE 485
Computer Organization & Design
This course covers basic concepts and state-of- the-art developments in computer architecture: computer technology, performance measures, instruction set design, computer arithmetic, controller and datapath design, memory systems, pipelining, array processing, parallel processing, multiprocessing, abstract analysis models, input-output systems, relationship between computer design and application requirements, and cost/performance tradeoffs. Students will complete a project implementing a version of multiple-cycle processor. Credit will be given for either ECE 485 or CS 470, but not both.
Prerequisite(s): [(ECE 218 and ECE 242)]
(3-0-3) **(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) **(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) **(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) **(P)**

Special Note
ECE undergraduate students are not permitted to take any ECE courses via Internet, unless they have the written permission of the course instructor, their academic advisor, and the ECE chair. Any ECE undergraduate student wishing to take a graduate course for a degree program must have the written approval of the course instructor, faculty advisor, and the ECE department chair. Generally, a 3.5/4.0 major GPA is required for department approval.

ECE 502
Basic Network Theory

ECE 505
Applied Optimization for Engineers

ECE 506
Analysis of Nonlinear Systems

ECE 507
Imaging Theory and Applications

ECE 508
Video Communications

ECE 509
Electromagnetic Field Theory

ECE 511
Analysis of Random Signals

ECE 513
Communication Engineering Fundamentals

ECE 514
Digital Communication Principles

ECE 515
Modern Digital Communications

ECE 519
Coding for Reliable Communications

ECE 521
Quantum Electronics

ECE 524
Electronic Circuit Design

ECE 525
RF Integrated Circuit Design

ECE 526
Active Filter Design

ECE 527
Performance Analysis of RF Integrated Circuits

ECE 529
Advanced VLSI Systems Design

ECE 530
High Performance VLSI/IC Systems

ECE 531
Linear System Theory

ECE 535
Discrete Time Systems

ECE 537
Optimal Feedback Control

ECE 538
Renewable Energies

ECE 539
Computer-Aided Design of Electric Machines

ECE 540
Reliability Theory and System Implementation

ECE 541
Performance Evaluation of Computer Networks

ECE 542
Design and Optimization of Computer Networks

ECE 543
Computer Network Security

ECE 544
Wireless and Mobile Networks

ECE 545
Advanced Communication Networks

ECE 546
Wireless Network Security

ECE 548
Energy Harvesting

ECE 549
Motion Control Systems Dynamics

ECE 550
Power Electronic Dynamics and Control

ECE 551
Advanced Power Electronics

ECE 552
Adjustable Speed Drives

ECE 553
Power System Planning

ECE 554
Power System Relaying

ECE 555
Power Market Operations

ECE 556
Power Market Economics and Security

ECE 557
Fault-Tolerant Power Systems

ECE 558
Power System Reliability

ECE 559
High Voltage Power Transmission

ECE 560
Power Systems Dynamics and Stability

ECE 561
Deregulated Power Systems

ECE 562
Power System Transaction Management

ECE 563
Computational Intelligence in Engineering

ECE 564
Control and Operation of Electric Power Systems

ECE 565
Computer Vision and Image Processing

ECE 566
Statistical Pattern Recognition

ECE 567
Statistical Signal Processing

ECE 568
Digital Speech Processing

ECE 569
Digital Signal Processing II

ECE 570
Fiber-Optic Communication Systems

ECE 571
Nanodevices and Technology

ECE 575
Electron Devices

ECE 576
Antenna Theory

ECE 578
Microwave Theory

ECE 580
Elements of Sustainble Energy

ECE 581
Elements of Smart Grid

ECE 583
High Speed Computer Arithmetic

ECE 584
VLSI Architecture for Signal Processing and Communication Systems

ECE 585
Advanced Computer Architecture

ECE 586
Fault Detection in Digital Circuits

ECE 587
Hardware/Software Codesign

ECE 588
CAD Techniques for VLSI Design

ECE 589
Computer-Aided Design of Analog IC

Economics

ECON 151
The Economics of the Firm
The course looks at the consequences of scarcity on business behavior–the use of cost-benefit analysis, opportunity cost, and comparative advantage. It examines the influence of supply and demand on markets, and the influence of cost conditions and market structure on the behavior of the firm. The concept of economy efficiency is then used to examine government regulation of business.
(3-0-3) **(C)(S)**

ECON 152
National & Global Economics
The course looks at national and international statistics–real output, inflation, unemployment, and interest rates. It examines fiscal and monetary policy and how they influence the important measures of an economy's performance. Then the analysis is extended to the interaction between national economies and how this influences trade and capital flows between countries and determines exchange rates.
(3-0-3) **(C)(E)(S)**

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.
(3-0-3) **(S)**

ECON 423
Economic Analysis of Capital Investments
The evaluation of proposed capital investments in the public and private sectors. Equivalent worth, rate of return, and benefit/cost methods. Treatment of the time value of money, taxes, inflation, risk, interrelated investments and capital budgeting. Offered in fall and spring.
(3-0-3) **(S)**

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

ECON 513
Macro in the Global Economy

ECON 570
Theory of the Firm

Engineering Graphics

EG 105
Engineering Graphics & Design
Basic traditional and computer-based techniques and applications, multiview sketching, orthographic projection, isometric and oblique pictorials, sectioning, auxiliary views, principles of descriptive geometry, dimensioning, detail drawings, introduction to design and computer-aided drafting and design (CAD).
(1-2-2)

EG 204
Blueprint Reading for Machine Industries
Industrial prints, views of objects, analysis of edges and surfaces, sectional views, auxiliary views, screw threads and fasteners, dimensioning, shop processes, and welding representation.
(1-3-2)

EG 224
Blueprint Reading for Building Trades
Analysis of building construction drawings and details, dimensioning, shop processes, use of symbols and conventions, material takeoff, and elementary estimating.
(1-3-2)

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.
(2-1-3)

EG 305
Advanced Engineering Graphics & 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 (EG 105)]
(2-1-3)

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 problems. Shades and shadows, conics, map projection and spherical triangles. Emphasis on those applications which promote visualization and introduce new engineering experience. Applications of computers to problem solving.
Prerequisite(s): [(CAE 101) OR (EG 105)]
(2-2-3)

EG 308
Architectural Drawing I
Elements of architectural drafting. Lettering, symbols, plan layout, and elementary design in basic materials. Standard details of windows, doors, floors, roofs, stairs, framing. Perspective sketching.
(2-2-3)

EG 309
Architectural Drawing II
A continuation of EG 308, with more complicated layout problems of residential, small commercial, and industrial buildings. Detailed study of functions of the building. Methods of construction and use of materials and simple perspectives.
Prerequisite(s): [(EG 308)]
(2-2-3)

EG 310
Architectural Drawing III
Individual problems assigned to each student; each project developed from schematic plan through all stages of design, including sketches, working drawings, and presentation drawings; perspective drawing with rendering in all media.
Prerequisite(s): [(EG 309)]
(2-2-3)

EG 312
Architectural Freehand Drawing
Accurate and rapid sketching, with special emphasis on architectural forms, proportions, perspective; pencil, crayon, chalk, and brush techniques; simple composition problems.
(2-2-3)

EG 313
Architectural Detailing
Comprises design and drawing and the fitting together of various materials used in erecting and finishing contemporary and traditional buildings.
Prerequisite(s): [(EG 309)]
(2-2-3)

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)]
(2-1-3)

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 two- and three-dimensional line 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)]
(3-0-3)

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.
Prerequisite(s): [(EG 305)]
(2-2-3)

EG 406
Technical & 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.
Prerequisite(s): [(CAE 101) OR (EG 105)]
(2-2-3)

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)]
(2-2-3)

EG 419
Computer Graphics in Engineering
Techniques of PC-based computer-aided drawing and design. Study of various 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 (EG 105)]
(2-2-3)

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.
Prerequisite(s): [(EG 325)]
(2-1-3)

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.
Prerequisite(s): [(EG 329)]
(2-2-3)

EG 497
Special Problems
Special problems.
(Credit: Variable)

Environmental Engineering

ENVE 296
Introduction to IPRO
Introduction to process design. Performance of selected design tasks in project groups. Practice with process design software.
(0-2-1)

ENVE 310
Introduction to Environmental Engineering
Principles and applications of engineering processes for air and water pollution control. Topics include environmental resource management and methods for environmental quality control including identification of pollution sources, effects, and controls.
(3-0-3)

ENVE 401
Introduction to Water-Resources Engineering
Principles of hydraulics and water demand projections as used in the design of reservoirs, water distribution systems, and storm and sanitary sewers; aspects of water resource management and environmental engineering economics.
Prerequisite(s): [(CHE 301)]
(3-0-3)

ENVE 404
Water & Wastewater Engineering
Principles and applications of physical, chemical, and biological processes for water and waste purification. Design of engineering treatment systems to meet water quality and effluent standards. Requires junior standing.
(3-0-3)

ENVE 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. Requires junior standing.
(3-0-3)

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; legal and administrative aspects of air pollution control.
(3-0-3)

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)]
(3-0-3)

ENVE 481
Hazardous Waste Engineering
Engineering principles applied to the control of hazardous waste generation, handling, collection, transport, processing, recovery, and disposal. Treatability and design of hazardous waste treatment process.
Prerequisite(s): [(ENVE 463)]
(2-3-3)

ENVE 485
Pollution Prevention
Industrial Ecology is the study of how to manage human activity on a sustainable basis. It is an interdisciplinary field involving technology (sciences and engineering), public policy and regulatory issues, and business administration. The overall goal of this course is to promote creative and comprehensive problem solving through the application of Industrial Ecology tools such as Industrial Metabolism, Input-Output Analysis, Life Cycle Assessment, Accounting, and Design for the Environment. Same as EM 507.
(3-0-3)

ENVE 496
Chemical Process Design II
Group project in process design. Integration of technical, safety, environmental, economic and societal issues in process development and design.
(3-0-3)

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

ENVE 501
Environmental Chemistry

ENVE 503
Water and Wastewater Analysis

ENVE 506
Chemodynamics

ENVE 513
Biotechnological Processes in Environmental Engineering

ENVE 545
Environmental Regulations and Risk Assessment

ENVE 570
Air Pollution Meteorology

ENVE 572
Ambient Air Monitoring

ENVE 576
Indoor Air Pollution

ENVE 585
Groundwater Contamination and Pollutant Transport

History

HIST 300
World History to 1500
Development of Greek and Roman civilization; beginnings of Christianity; Europe in the Middle Ages; feudalism and manorialism; organization of the Church; the Crusades; medieval intellectual life; the Renaissance.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(H)**

HIST 301
World History from 1500
Protestant Reformation; the Scientific Revolution; Age of Louis XIV; Enlightenment; the Age of Democratic Revolution; Industrial Revolution; Nationalism and Imperialism; World War I; Communism and Fascism; World War II and after.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(H)**

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)]
(3-0-3) **(C)(H)**

HIST 307
History of Latin American Cinema
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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

HIST 332
American Women 1840-1990
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)]
(3-0-3) **(C)(H)**

HIST 333
Ethnicity in American History & 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)]
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

HIST 338
Contemporary America: 1960 & 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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(H)**

HIST 345
Women & 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)]
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

HIST 385
The Origins of Modern Science
An examination of the profound change in our conception of the natural world from Copernicus (1500 A.D.) to Newton (1700 A.D.); how the adoption of experimentation, quantification, and new instruments created a new conception of scientific method and the goals and nature of scientific knowledge.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(H)**

HIST 491
Independent Reading & Research
Consent of department. For advanced students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(H)**

Humanities

HUM 102
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.
Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) **(C)(H)**

HUM 104
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.
Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) **(C)(H)**

HUM 106
Life Stories
An interdisciplinary study of autobiographies, written chiefly by Americans. The syllabus varies, but may include Benjamin Franklin, Harriet Jacobs, Maya Angelou, Malcolm X, Langston Hughes, Richard Rodriguez, Thomas Merton, Frank Lloyd Wright, Judy Chicago. In addition to considering autobiography as a genre, the course examines the historical events and the philosophical issues that have shaped the lives and attitudes of these writers.
Prerequisite(s): [(COM 101) OR (COM 111) OR (IIT Communication Placement: 102)]
(3-0-3) **(C)(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): [(HUM 102) OR (HUM 104) OR (HUM 106)] AND Satisfaction of IIT's Basic Writing Proficiency Requirement
(3-0-3) **(C)(H)**

HUM 491
Independent Reading/Research
Independent reading or research.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(H)**

Industrial Technology and Management

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.
(3-0-3) **(C)**

INTM 314
Maintenance Technology & Management
Maintenance of facilities is a major concern for all industrial operations. Course covers technologies involved as well as the management aspects of maintaining buildings, construction and equipment installation and maintenance for all types of operations.
(3-0-3)

INTM 315
Industrial Enterprises
This course provides an introduction to the world of industrial enterprises. The world-wide evolution of business will be considered leading to today's competitive world. The range of industrial activities is reviewed, and students are introduced to the organization and purpose of various industrial sectors.
(3-0-3)

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.
(3-0-3)

INTM 322
Industrial Project Management
This course will teach the techniques for managing projects and programs of all types. Coverage includes organization and operation of the project team. Techniques for managing and tracking projects will be covered along with computerized tools available for project management.
(3-0-3) **(C)**

INTM 404
Sales, Marketing & Product Introduction
Covers techniques of marketing research, strategies for new product introduction, and sales management and planning.
(3-0-3) **(C)**

INTM 406
Quality Control in Manufacturing
Topics include quality control based on metrology and overall quality control systems. Metrological techniques covered include mechanical, electrical, materials and chemical perspectives. Such QC issues as SPC, ISO 9000, MilSpec and TQM are examined. Emphasis is on exploring options and consequences of selecting appropriate methodologies.
(3-0-3)

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.
(3-0-3)

INTM 408
Cost Management
Accounting basics are introduced with primary emphasis on the costing and estimating procedures as used in industry. The objective of this course is to provide a good understanding of financial activities and hands-on experience in working with a variety of costing and accounting systems.
(3-0-3)

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, external and internal lead times, excess/obsolete inventory, and inventory controls. Material Resource Planning (MRP) and Enterprise Resource Planning (ERP) are included.
(3-0-3) **(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 advanced approaches covered in other INTM courses.
(3-0-3) **(C)**

INTM 412
Manufacturing Processes for Metals & Mechanical Systems
Material processing and manufacturing techniques are covered for solid materials, including metals, plastics, ceramics, and glass. Making of parts from these materials is covered along with subsequent assembly of these parts into components, subassemblies, and final products. Advance Manufacturing Technologies (AMT) will be covered including robots, lasers, AGVs, etc. The industrial structure that makes up this sector of manufacturing will be covered.
(3-0-3)

INTM 413
Facilities & Construction Administration
Students learn about management of existing facilities including routine service and maintenance activities. Tools and techniques for managing new construction and renovation projects are covered, as well as organizational structures and management approaches for these activities.
(3-0-3)

INTM 414
Topics in Industry
Provides overview of multiple industrial sectors and the influences that are forcing change. All aspects of industry are considered: history of industry; inventory; supply chain; e-commerce; management; manufacturing; industrial facilities; resource management; electronics and chemical industries; alternate energies; marketing; entrepreneurship; computers as tools; and other speciality areas.
(3-0-3) **(C)**

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.
(3-0-3)

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.
(3-0-3)

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.
(3-0-3)

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.
(3-0-3)

INTM 422
Mechanical Technology
This course reviews the technical fundamentals applicable to industrial operations and systems for mechanical components, subassemblies and products. The student surveys a broad range of topics starting from basic technical principles and continues through application of devices, systems and standards commonly encountered in industry.
(3-0-3)

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.
(3-0-3) **(C)**

INTM 427
E-Commerce
This course reviews electronic commerce and its role in industrial organizations. Topics include a history of e-commerce, business-to-business (B2B) models, and business-to- consumer (B2C) models. The impact of this paradigm shift on all aspects of business is also covered.
(3-0-3) **(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. Security issues in domestic and international transportation will be part of the course. Lecturers with years of practical transportation experience in the corporate world will provide students with their perspective on the role of transportation in today's economy.
(3-0-3)

INTM 431
Manufacturing Processes for Electronics & Electrical Systems
The materials used in Electronic and Electrical (E&E) manufacturing will be reviewed including materials and components that are used to produce chips, PCBs, and wiring systems. Focus will be on the processes for producing the range of parts and products included in this broad sector. Automation for producing parts and assemblies will be covered. Techniques covered will include surface-mounted technology (SMT), wave soldering, automation insertion, automated inspection, etc. The industrial structure that makes up this sector of manufacturing will be covered.
(3-0-3)

INTM 432
Vendor/Customer Relations
Relations with customers and vendors constitute a critical aspect of company profitability. The course pursues such topics as appropriate involvement of customers and vendors in product development, as well as price and contract negotiations.
(3-0-3) **(C)**

INTM 433
Manufacturing Processes for Chemical & Process Systems
This course will cover materials and manufacturing based on process systems. This would include painting, anodizing, plating, plastic preparation, plastics manufacturing, cleaning, etc., along with the processes for producing the chemicals involved. Environmental and hazardous material issues are of importance and "green systems" that minimize the use of resources are encouraged. OSH, EPA, and other regulatory systems will be covered. The industrial structure that makes up this sector of manufacturing will be covered.
(3-0-3) **(C)**

INTM 434
Industrial Futures
This course allows a futuristic view of industrial establishments of interest to the student and INTM staff, who must work to develop individual or group projects.
(3-0-3) **(C)**

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.
(3-0-3) **(C)**

INTM 442
Warehousing & 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.
(3-0-3) **(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.
(3-0-3) **(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.
(3-0-3) **(C)**

INTM 446
Manufacturing & Logistics Information Systems
This course provides an overview of manufacturing and supply chain information systems, tools, and techniques utilized for effective decision making. Current state-of-the-art and commercially available industrial software packages, such as MRP, WMS, TMS, APS, etc., will be used and their impact on management decision making analyzed.
(3-0-3)

INTM 449
Telecommunications Over Data Networks
This course covers a suite of application protocols known as Voice over IP (VoIP). It describes important protocols within that suite including RTP, SDP, MGCP and SIP, and the architecture of various VoIP installations including on-net to on-net, on-net to PSTN, and Inter-domain scenarios. The functions of the Network Elements that play significant roles in this architecture will be defined. Examples of network elements that are currently available as products will be examined.
Prerequisite(s): [(ITM 440) OR (ITM 540)]
(3-0-3)

INTM 460
The Carbon Economy
The world's economy is highly dependent on fossil fuel removed from the ground as coal, oil, or natural gas. Population and economic growth are expected to increase dependence on these carbon resources. Concerns about global warming caused by increasing levels of carbon dioxide require consideration of approaches to mitigate the impact. This course examines current approaches to mitigating the problems through increased energy efficiency and sequestering the carbon. Also covered are approaches using biomass and agricultural wastes to provide renewable carbon sources.
(3-0-3) **(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.
(3-0-3) **(C)**

INTM 477
Entrepreneurship in Industry
This course is available to all students interested in manufacturing and the activities that support manufacturing including logistics, business, facilities and engineering. The emphasis will be on the role of entrepreneurship in existing manufacturing and related industries as well as in start-up companies. Since manufacturing and related industrial activities represent over 30% of the economy, the economic future of the nation depends on the health of this sector. The objective of this course is to provide the skills to the students to introduce innovation and entrepreneurship in manufacturing and the industry that supports it.
(3-0-3) **(C)**

INTM 491
Undergraduate Research
Undergraduate research.
(Credit: Variable)

INTM 497
Special Projects INTM
Special projects.
(Credit: Variable)

Interprofessional Projects

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.
(1-6-3) **(C)**

Information Technology and Management

ITM 100
Introduction to Information Technology as a Profession
This course introduces students to the steps necessary to analyze a problem in information technology and identify and define the computing requirements appropriate to its solution, with a focus on how to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. Students learn to analyze the local and global impact of computing on individuals, organizations, and society. This course leads students to recognize 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 work in teams learning to function effectively together to accomplish a common goal.
(2-0-2) **(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.
(0-0-3) **(C)**

ITM 301
Introduction to Contemporary Operating Systems & Hardware I
Students study the basics of computer architecture and learn to use a contemporary operating system. Hardware requirements, microcomputer components, software compatibility and system installation and options are covered, along with post-installation topics, storage, security and system diagnosis and repair.
(2-2-3)

ITM 302
Introduction to Contemporary Operating Systems & Hardware II
Introduces features of an advanced operating system, including basic commands, file and directory manipulation, text editing and suitability for server applications. Basic programming in this environment will be addressed through shell scripting for job automation along with shell built-in data types, condition, loops, functions and regular expressions.
(2-2-3)

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, creating stand-alone applications and applets for enhancing web pages.
(2-2-3)

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 header files, work with and effectively use basic data types, compile source code into binary executable files, and understand use of the "make" utility for project management.
(2-2-3)

ITM 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)]
(2-2-3)

ITM 412
Advanced Structured & 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)]
(2-2-3)

ITM 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): [(ITM 311)]
(2-2-3)

ITM 415
Advanced Software Develpment
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): [(ITM 411)]
(2-2-3)

ITM 419
Topics in Application Development
This course will cover a particular topic, 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 ITM 419 credit may be applied to a degree. Permission of instructor is required.
(Credit: Variable)

ITM 421
Data Modeling & 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.
(2-2-3)

ITM 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): [(ITM 421)]
(3-0-3) **(C)**

ITM 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): [(ITM 421)]
(3-0-3)

ITM 434
Human/Computer Interaction
Introduction to human-computer interaction, a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use. Emphasis is given to the structure of communication between people and computers, capabilities of people to use computers, concerns that arise in designing and building interfaces, design trade-offs, and the process of specification, design, and implementation of user interfaces. Particular emphasis is placed on practical design and usability of computer system user interfaces.
(3-0-3)

ITM 440
Introduction to Data Networking & 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, Bluetooth, 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.
(2-2-3)

ITM 441
Network Administration & 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): [(ITM 440)]
(2-2-3)

ITM 443
Vulnerability Analysis & Control
This course addresses hands-on ethical hacking, penetration testing, 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. It is recommended, but not required,that students also take ITM 448 prior to or in parallel with this course.
Prerequisite(s): [(ITM 440)]
(2-2-3)

ITM 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): [(ITM 301 and ITM 311)]
(2-2-3)

ITM 448
System & Network Security
Prepares students for a role as a network security analyst and administrator. Topics include hacking, vulnerabilities, and countermeasures; network security protocols, encryption, identity and authentication, scanning, firewalls, security tools, and organizations addressing security. A key component of this course is a self-contained team project.
Prerequisite(s): [(ITM 440)]
(2-2-3) **(C)**

ITM 451
Distributed Workstation System Administration
Students learn to set up and maintain PC workstations and servers and to administer PC servers and networks. Topics include hardware requirements; software compatibility; and system installation, configuration and options and post-installation topics; administrative practices required for file system security; process management; performance monitoring and tuning; storage management; back-up and restoration of data; and disaster recovery and prevention.
Prerequisite(s): [(ITM 301)]
(4-4-6)

ITM 452
Client Server System Administration
Students learn to setup and configure a contemporary operating system, including the actual installation of the operating system on the student workstation in a networked client-server environment. User account management, security, printing, disk configuration, and backup procedures are addressed, with particular attention to coverage of TCP/IP and TCP/IP applications. System installation, configuration and administration issues as well as network file systems, network access and compatibility with other operating systems are also addressed.
Prerequisite(s): [(ITM 302)]
(4-4-6)

ITM 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 (ITM 302)]
(2-2-3)

ITM 455
Intelligent Device Technologies
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)]
(2-2-3)

ITM 456
Introduction to Open Source Operating Systems
Students learn to set up and configure an industry-standard open-source operating system, including the actual installation of the operating system on the student workstation. Also addressed are applications and graphical user interfaces as well as support issues for open source software.
Prerequisite(s): [(ITM 302)]
(2-2-3)

ITM 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): [(ITM 301) OR (ITM 302)]
(2-2-3)

ITM 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.
(2-2-3) **(C)**

ITM 461
Internet Technologies & Web Design
This course will cover how the Internet is organized, addressing, routing, DNS, protocols, TCP/IP, SMTP, the use of Internet applications, and the creation of Web pages using HTML and graphical applications. Networked multimedia distribution technologies are also explored. The design of effective Web site including page layout, user interface design, graphic design, content flow and site structure as well as management of Web site resources including intranet management and design considerations are addressed. Students design and create a major Web site with multiple pages and cross-linked structures.
(2-2-3) **(C)**

ITM 462
Web Site Application Development
Programming the Common Gateway Interface (CGI) for Web pages is introduced with emphasis on creation of interfaces to handle HTML form data. CGI programming is taught in multiple languages. Security of Web sites is covered with an emphasis on controlled access sites. Setup, administration and customization of content management systems including blog and portal sites is introduced. Students design and create a Web site including basic CGI programs with Web interfaces and process data flows from online forms with basic database structures.
Prerequisite(s): [(ITM 461)]
(2-2-3) **(C)**

ITM 465
Rich Internet Applications
Students learn to create interactive rich internet applications using web development frameworks, applications, and techniques that primarily operate on the client-side. These applications often exhibit the same characteristics as desktop applications and are typically delivered through a standards-based web browser via a browser plug-in or independently via sandboxes or virtual machines. Current software frameworks used to download, update, verify, and execute these applications are addressed as well as writing applications for deployment in these frameworks.
Prerequisite(s): [(ITM 461)]
(2-2-3)

ITM 466
Service-Oriented Architectures
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): [(ITM 461)] AND [(ITM 411)]
(2-2-3)

ITM 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 ITM 469 credit may be applied to a degree. Permission of instructor is required.
(Credit: Variable)

ITM 471
Project Management for Information Technology & 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.
(3-0-3) **(C)**

ITM 478
Information System 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.
(3-0-3) **(C)**

ITM 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 ITM 479 credit may be applied to a degree. Permission of instructor is required.
(Credit: Variable)

ITM 491
Undergraduate Research
Undergraduate research. Written consent of instructor is required.
(Credit: Variable)

ITM 492
Embedded Systems & Reconfigurable Logic Design
This course covers embedded system design fundamentals. Working with various microcontrollers, microprocessors, and DSPs, the student will discover hardware, software, and firmware design tradeoffs, tool chains, and best practices in current embedded systems development. Laboratory exercise and experience reinforce the lecture concepts. A course project encapsulates all topics culminating in an embedded system designed and implemented from the ground up. The student should be familiar with analog and digital design methods, computer architecture and structured/procedural programming techniques.
(4-4-6)

ITM 495
Topics in ITM
This course will cover a particular topic varying from semester to semester in which there is particular student or staff interest. Permission of instructor is required.
(3-0-3)

ITM 497
Independent Study
Special projects.
(Credit: Variable)

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

ITM 511
Application Development Methodologies

ITM 518
Coding Security

ITM 521
Client/Server Technologies and Applications

ITM 526
Data Warehousing

ITM 527
Data Analytics

ITM 529
Advanced Data Analytics

ITM 531
Object-Oriented System Analysis, Modeling and Design

ITM 532
UML-Based Software Development

ITM 533
Operating System Design and Implementation

ITM 535
Data Center Architecture

ITM 537
Instructional Technologies

ITM 539
Steganography

ITM 542
Wireless Technologies and Applications

ITM 545
Telecommunications Technology

ITM 546
Telecommunications Over Data Networks

ITM 547
Digital and Voice Communications Projects

ITM 549
System and Network Security: Projects and Advanced Methods

ITM 556
Intelligent Device Projects

ITM 564
Advanced Website Application Development

ITM 572
Process Engineering for IT Managers

ITM 573
Building and Leading Effective Teams

ITM 574
Information Technology Management Frameworks

ITM 575
Networking and Telecommunications Management

ITM 576
Data Center Management

ITM 581
ITM Entrepreneurship

ITM 582
Business Innovation

ITM 585
Legal and Ethical Issues in Information Technology

ITM 586
Information Technology Auditing

ITM 588
Incident Response, Disaster Recovery and Business Continuity

ITM 593
Embedded Systems

Landscape Architecture

LA 414
Professional Practice
An introduction to landscape architecture as a profession. Topics addressed include areas of practice, project management, office operations, career development, governmental regulations, licensure, and professional ethics.
(3-0-3)

LA 443
Forests, Preserves, Parks, & Urbanscapes
The growing need for these public site types in America in the 1800s gave rise to the landscape architecture profession. More necessary now than ever, the planning and design approach to these sites is undergoing major change. In this course students will investigate the historical and contemporary environmental and cultural relationships of the American landscape. Themes include landscape use and ecological change, regional and national landscapes, the roles of the National Park Service, state and county park and forest systems, and municipal green spaces. Case studies and analyses of specific sites.
(3-0-3)

LA 497
Special Projects
Special projects.
(Credit: Variable)

Literature

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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

LIT 317
The Novel Today
An examination of major world fiction since World War II. Readings will be chosen from such writers as Graham Greene, Alexander Solzhenitsyn, Heinrich Boll, Saul Bellow, Robertson Davies, and Gabriel Marquez, Nadine Gordimer, Toni Morrison, and Salman Rushdie.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

LIT 337
Shakespeare: Early Work
Study of Shakespeare's work before 1600, focusing on the histories, early comedies and tragedies. Close reading of the plays' language and form, and emphasis on the place of drama in early modern culture. Syllabus varies but is likely to include Taming of the Shrew, Much Ado About Nothing, Parts 1 and 2 of Henry IV, Henry V, Hamlet.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(H)**

LIT 338
Shakespeare: Late Work
Study of Shakespeare's work after 1600, focusing on the middle and late comedies and tragedies and the romances. Close reading of the plays' language and form, and emphasis on the place of drama in early modern culture. Syllabus varies but is likely to include Twelfth Night, Macbeth, Coriolanus, Othello, King Lear, The Winter's Tale and The Tempest. May be taken independently of LIT 337.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

LIT 491
Independent Reading & Research
Consent of department. For advanced students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(H)**

LIT 497
Special Projects
Special project.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(H)**

Mathematics

Note
Courses indicated by an asterisk (*) do not count towards any computer science, engineering, mathematics, or natural science degree program.

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.
(2-0-2) **(C)**

MATH 119*
Geometry for Architects
Basic 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.
(3-0-3) **(C)**

MATH 120*
Business Mathematics I
An introduction to the mathematics used in the study of finance, financial markets, and economics.
(3-0-3)

MATH 121*
Business Mathematics II
An introduction to the mathematics used in the study of finance, financial markets, and economics.
(3-0-3)

MATH 122*
Introduction to Calculus
Basic concepts of calculus of a single variable; limits, derivatives, integrals. Applications.
(3-0-3)

MATH 148*
Calculus/Precalculus I
Review of algebra and analytic geometry. Functions, limits, derivatives. Trigonometry, trigonometric functions and their derivatives. Chain rule, implicit and inverse functions, and inverse trigonometric functions.
(4-0-4)

MATH 149
Calculus/Precalculus II
Applications of derivatives; related rates, maxima and minima, monotonicity, concavity, graphing, optimization. Antiderivatives, first order differential equations. Definite integral and applications. Implicit and inverse functions, and inverse trigonometric functions.
Prerequisite(s): [(MATH 148 with min. grade of C)]
(4-1-5) **(C)**

MATH 151
Calculus I
Analytic geometry. Functions and their graphs. Limits and continuity. Derivatives of algebraic, trigonometric and inverse trigonometric functions. Applications of the derivative. Introduction to integrals and their applications.
Prerequisite(s): [(IIT Mathematics Placement: 151)]
(4-1-5) **(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 transfer credit) OR (MATH 151 with min. grade of C)]
(4-1-5) **(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.
(3-0-3) **(C)**

MATH 251
Multivariate & Vector Calculus
Analytic geometry in three-dimensional space. Partial derivatives. Multiple integrals. Vector analysis. Applications.
Prerequisite(s): [(MATH 152)]
(4-0-4)

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)]
(4-0-4)

MATH 300
Perspectives in Analysis
The course is focused on selected topics related to fundamental concepts and methods of classic analysis and their applications with emphasis on various problem-solving strategies, visualization, mathematical modeling, and interrelation of different areas of mathematics.
Prerequisite(s): [(MATH 251 and MATH 252)]
(3-0-3)

MATH 332
Matrices
Matrix algebra, rank, inverses; systems of linear equations, determinants; eigenvalues and eigenvectors.
Prerequisite(s): [(MATH 251*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MATH 333
Matrix Algebra & 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. Course does not satisfy graduation requirements for Applied Mathematics majors.
Prerequisite(s): [(MATH 251)]
(3-0-3)

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 105, MATH 251, and MATH 252) OR (CS 115, MATH 251, and MATH 252)]
(3-0-3)

MATH 400
Real Analysis
Real numbers, continuous functions; differentiation and Riemann integration. Functions defined by series.
Prerequisite(s): [(MATH 251)]
(3-0-3)

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)]
(3-0-3)

MATH 405
Introduction to Iteration & 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, MATH 252, and MATH 332) OR (MATH 251, MATH 252, and MATH 333)]
(3-0-3) **(C)**

MATH 410
Number Theory
Divisibility, congruencies, distribution of prime numbers, functions of number theory, diophantine equations, applications to encryption methods.
Prerequisite(s): [(MATH 230)]
(3-0-3)

MATH 420
Geometry
The course is focused on selected topics related to fundamental concepts and methods of Euclidean 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.
Prerequisite: Permission of instructor.
(3-0-3)

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. Course does not satisfy graduation requirements for Applied Mathematics majors.
(3-0-3)

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 Course does not satisfy graduation requirements for Applied Mathematics majors. Requires sophomore standing.
(3-0-3)

MATH 430
Applied Algebra
Relations; modular arithmetic; group theory: symmetry, permutation, cyclic, and abelian groups; group structure: subgroups, cosets, homomorphisms, classifications theorems; rings and fields. Applications to crystallography, cryptography, and check-digit schemes.
Prerequisite(s): [(MATH 230) OR (MATH 332)]
(3-0-3)

MATH 431
Applied Algebra II
Ring homomorphisms; factorization and reducibility in polynomial rings; integral domains; vector spaces; fields and their extensions. As time permits, application to one or more of the following: Frieze and crystallographic groups, Caley digraphs, and coding theory.
Prerequisite(s): [(MATH 430)]
(3-0-3)

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)]
(3-0-3)

MATH 453
Combinatorics
Permutations and combinations; pigeonhole principle; inclusion- exclusion principle; recurrence relations and generating functions; enumeration under group action.
Prerequisite(s): [(MATH 230)]
(3-0-3)

MATH 454
Graph Theory & Applications
Graph theory is the study of systems of points with some of the pairs of points joined by lines. Sample topics include: paths, cycles and trees; adjacency and connectivity; directed graphs; Hamiltonian and Eulerian graphs and digraphs; intersection graphs. Applications to the sciences (computer, life, physical, social) and engineering will be introduced throughout the course. Credit will not be granted for both MATH 454 and MATH 553
Prerequisite(s): [(MATH 230 and MATH 251) OR (MATH 230 and MATH 252)]
(3-0-3)

MATH 461
Fourier Series & 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)]
(3-0-3)

MATH 474
Probability & 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. Course does not satisfy graduation requirements for Applied Mathematics majors.
Prerequisite(s): [(MATH 251)]
(3-0-3)

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)]
(3-0-3)

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)]
(3-0-3)

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)]
(3-0-3)

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)]
(3-0-3)

MATH 481
Introduction to Stochastic Processes
This is an introductory 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 the business applications. The course introduces the most fundamental ideas in the area of modeling and analysis of real World phenomena in terms of stochastic processes. The course covers different classes of Markov processes: discrete and continuous-time Markov chains, Brownian motion and diffusion processes. It also presents some aspects of stochastic calculus with emphasis on the application to financial modeling and financial engineering. Credit will not be granted for MATH 481 and 542.
Prerequisite(s): [(MATH 332 and MATH 475) OR (MATH 333 and MATH 475)]
(3-0-3)

MATH 483
Design & Analysis of Experiments
Principles of estimation; hypothesis-tests, confidence intervals. Contingency tables; goodness-of-fit. Analysis of variance; linear regression. Hierarchical and split-plot designs; analysis of covariance. Multiple regression.
Prerequisite(s): [(MATH 476)]
(3-0-3)

MATH 485
Introduction to Mathematical Finance
This is an introductory course in mathematical finance. Technical difficulty of the subject is kept at a minimum by considering a discrete time framework. Nevertheless, the major ideas and concepts underlying modern mathematical finance and financial engineering will be explained and illustrated. Credit may not be granted for MATH 485 and MATH 548.
Prerequisite(s): [(MATH 475)]
(3-0-3)

MATH 486
Mathematical Modeling I
A general introduction to optimization problems. Linear programming: the simplex method. Elements of graphs and networks. Introduction to game theory. Applications.
Prerequisite(s): [(MATH 475)]
(3-0-3) **(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)]
(3-0-3) **(C)**

MATH 488
Ordinary Differential Equations & 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 251 and MATH 252)]
(3-0-3)

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 461)]
(3-0-3)

MATH 491
Reading & Research
Independent reading and research.
(Credit: Variable) **(C)**

MATH 497
Special Problems
Special problems.
(Credit: Variable) **(C)**

Military Science

MILS 101
Foundation of Officership
Issues and competencies that are central to a commissioned officer's responsibilities. Establish framework for understanding officership, leadership, and Army values followed and "life skills" such as physical fitness and time management.
(1-2-1) **(C)**

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.
(1-2-1) **(C)**

MILS 107
American Military History
Study of American military history through examination of evolvement of the Army and warfare.
(3-2-3)

MILS 147
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 148
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

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.
(3-0-3)

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.
(2-2-2)

MILS 202
Leadership & 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.
(2-2-2)

MILS 247
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 248
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 301
Leadership & 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.
(3-2-3) **(C)**

MILS 302
Leadership & 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)]
(3-2-3) **(C)**

MILS 347
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 348
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 350
Military Civil & 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.
(0-0-3)

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.
(3-0-3)

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.
(0-0-3)

MILS 401
Leadership & 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 301 and MILS 302)]
(3-2-3) **(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, MILS 302, and MILS 401)]
(3-2-3) **(C)**

MILS 447
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

MILS 448
Aerobic Conditioning
Participation in aerobic exercise program; evaluation of the level of cardiovascular fitness.
(0-3-2)

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)

Mechanical, Materials, and Aerospace Engineering

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.
(1-4-3) **(C)**

MMAE 200
Introduction to Mechanics
Equilibrium concepts. Statics of a particle. Statics of a system of particles and rigid bodies. Distributed forces, centroids and center of gravity. Friction. Kinetics of particles: Newton's Laws of motion, energy and momentum. Kinematics of particles. Dynamics of rotating bodies .
Prerequisite(s): [(MATH 152 and PHYS 123)]
(3-0-3)

MMAE 202
Mechanics of Solids II
Stress and strain relations, mechanical properties. Axially loaded members. Torsion of circular shafts. Plane stress and strain, Mohr's circle, stress transformation. Elementary bending theory, normal and shear stresses in beams, beam deflection. Combined loading.
Prerequisite(s): [(MMAE 200) OR (MMAE 201)]
(3-0-3)

MMAE 232
Design for Innovation
Product design and development including engineering design, good versus bad design, human-centered design, sketch models and prototyping, material selection, sustainable product development, product tear down, and product architecture. Global topics encompassing intellectual property, innovative thinking, global competitiveness, business economics, and managing product development.
Prerequisite(s): [(MMAE 100)]
(3-1-3)

MMAE 302
Mechanics of Solids III
Analysis of stress and strain. Torsional and bending structural elements. Energy methods and Castigliano's theorems. Curved beams and springs. Thick-walled cylinders and spinning disks. Pressure vessels. Contact stresses. Stability of columns. Stress concentration and stress intensity factors. Theories of failure, yield, and fracture. Fatigue.
Prerequisite(s): [(MATH 251, MATH 252, MMAE 202, and MMAE 232)]
(3-0-3)

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): [(MATH 251, MATH 252, and MMAE 202)]
(3-0-3)

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 (MMAE 201)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 306
Analysis & Design of Machine Elements
Analysis of stress and strain. Torsional and bending structural elements. Energy methods and Castigliano's theorems. Curved beams and springs. Thick-walled cylinders and spinning disks. Pressure vessels, contact stresses, stability of columns, stress concentration and stress intensity factors. Theories of failure, yield and fracture. Fatigue. Design of shafts, beams and springs. Design of gears and bearings.
Prerequisite(s): [(MATH 251, MATH 252, MMAE 202, and MMAE 371*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 310
Fluid Mechanics with Laboratory
Basic properties of fluids in motion. Lagrangian and Eulerian veiwpoints, material derivative, streamlines, etc. Continuity, energy and linear and angular momentum equations in integral and differential forms. Integration of equations for one-dimensional flows 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. Lab Component: Introduction to measurements of fluid properties and basic features of fluid flows; flow through pipes and channels, flow-induced forces on bodies; Conservation of energy; six laboratory experiments in small groups supplemented by demonstrations and films.
Prerequisite(s): [(MATH 251, MATH 252*, and MMAE 320*)] AND [(MMAE 200) OR (MMAE 201)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)**

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 310) OR (MMAE 313)] AND [(MMAE 320)]
(3-0-3)

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 310) OR (MMAE 313)] AND [(MMAE 311* and MMAE 320)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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): [(MATH 251, MATH 252*, and MMAE 320*)] AND [(MMAE 200) OR (MMAE 201)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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 310) OR (MMAE 313)]
(2-6-4)

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 310) OR (MMAE 313)] AND [(PHYS 221)]
(2-6-4)

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)]
(3-0-3)

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 310*) OR (MMAE 313*)] AND [(MMAE 320)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 322
Heat & Mass Transfer with Laboratory
Basic laws of transport phenomena, including: steady-state heat conduction; multi-dimensional and transient heat 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. Lab component: one-dimensional steady-state conduction; multi-dimensional steady state conduction; convection; heat exchanger analysis; radiation; phase change. Six laboratory experiments in small groups.
Prerequisite(s): [(MMAE 310) OR (MMAE 313)] AND [(MMAE 320)]
(3-3-4) **(C)**

MMAE 323
Heat & 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 310) OR (MMAE 313)] AND [(MMAE 320)]
(3-0-3)

MMAE 332
Design of Machine Elements
Students will gain an understanding of the basic elements used in machine design. These include the characteristics of gears, bearings, shafts, keys, couplings, fasteners, springs, electric motors, brakes and clutches, and flexible elements. Students will also learn mechanism types, linkage analysis, and kinematic synthesis.
Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MS 201)]
(3-0-3)

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): [(CS 105-201, MATH 251, MATH 252*, and MMAE 202*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 361
Fundamentals of Crystalline Solids
Imperfections in metals and ceramics. Dislocations and plastic deformation. The thermodynamic and kinetic principles of binary phase diagrams. Diffusion. Solidification.
Prerequisite(s): [(MMAE 371 and MS 201)]
(3-0-3)

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)]
(3-0-3) **(C)**

MMAE 365
Structure & 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.
(3-0-3)

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.
(1-6-3) **(C)**

MMAE 371
Engineering Materials & Design
Mechanical behavior of metals, polymers, ceramics and composites, laboratory testing methods including tension, torsion, harness, impact, toughness, fatigue and creep. Evaluation of structural performance in terms of material processing, service conditions and design. Formerly MMAE 271.
Prerequisite(s): [(MMAE 202 and MS 201)]
(2-3-3) **(C)**

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)]
(2-3-3)

MMAE 373
Instrumentation & 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)]
(2-6-4)

MMAE 406
Mechanical Vibrations
Study of free, forced and damped vibrations of single degree of freedom mechanical systems: resonance, critical damping, and vibration isolation. Two degree of freedom systems: natural frequencies, normal modes, resonances and vibration absorbers. Introduction to vibrations of multiple degree of freedom.
Prerequisite(s): [(MMAE 305 and MMAE 350)]
(3-0-3) **(C)**

MMAE 407
Biomechanics: Solids
Properties of mathematical models for bone, soft tissues, tendons, ligaments, cartilage and muscles. Human body structure, posture movement and locomotion. Spine mechanics and joint mechanics. Mechanics of occlusion and mastication. Exo- and endoprosthetics. Implants and biomechanical compatibility.
Prerequisite(s): [(MMAE 302) OR (MMAE 304) OR (MMAE 306)] AND [(MMAE 430*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3) **(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 312 and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 411
Spacecraft Dynamics
Orbital mechanics: two-body problem, Kepler's equation, classical orbital elements, and introduction to orbit perturbations. Spacecraft mission analysis: orbital maneuvers and station keeping, earth orbiting, lunar, and interplanetary missions, introduction to orbit determination. Spacecraft attitude dynamics: three-dimensional kinematics and dynamics of spacecraft, rotating reference frames and orientation angles, and spacecraft equations of motion. Spacecraft attitude stability and control: dual-spin platforms, momentum wheels, control-moment gyros, gravity gradient stabilization, introduction to spacecraft attitude determination and control.
Prerequisite(s): [(MMAE 200) OR (MMAE 201 and MMAE 305)] AND [(MATH 252)] AND [(MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 412
Spacecraft Design I
Launch vehicle design including a system engineering, payload mission definition, propulsion and staging, structural design, trajectory analysis and guidance, launch window considerations, navigation and attitude determination, booster re-entry, range safety, and reliability. Semester-long project is focused on the integration of multiple systems into a coherent launch vehicle design to achieve specific mission requirements.
Prerequisite(s): [(MMAE 302) OR (MMAE 304)] AND [(MMAE 411*)] AND [(MMAE 452)] An asterisk (*) designates a course which may be taken concurrently.
(2-3-3)

MMAE 413
Spacecraft Design II
Spacecraft systems design including real world mission analysis and orbit design, 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 design to achieve specific mission requirements.
Prerequisite(s): [(MMAE 411 and MMAE 412)]
(1-6-3)

MMAE 414
Aircraft Design I
Aircraft design including aerodynamic, structural, and powerplant 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 452)] An asterisk (*) designates a course which may be taken concurrently.
(2-3-3)

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)] AND [(MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(2-6-4)

MMAE 416
Aircraft Design II

Team project that includes conceptual design, detail design, prototyping, and testing (or simulation) of an aircraft model or aircraft subsystem to meet performance specifications.
Prerequisite(s): [(MMAE 410 and MMAE 414)]
(1-6-3)

MMAE 417
Advanced Aerodynamics

Unsteady aerodynamics, nonlinear flight regimes at high angle of attack, missile aerodynamics, hypersonic flight, and other topics relevant to the aerospace industry.
Prerequisite(s): [(MMAE 410*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 418
Fluid Power for Aerospace Applications

Basic principles and concepts needed for the design of fluid power systems. Emphasis is placed on flight control hardware for aircraft and launch vehicle applications.
Prerequisite(s): [(MMAE 416* and MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

MMAE 419
Mechanical Laboratory II

Laboratory testing methods including solid mechanics: tension, torsion, hardness, impact, toughness, fatigue and creep; heat and mass transfer: conduction, fins, convection, radiation, diffusion; vibrations and control. Design of experiments.
Prerequisite(s): [(MMAE 302)] AND [(MMAE 319)] AND [(MMAE 322) OR (MMAE 323)] AND [(MMAE 443*)] An asterisk (*) designates a course which may be taken concurrently.
(2-6-4)

MMAE 424
Internal Combustion Engines

Fundamentals of spark ignition and diesel engines. Combustion knock and engine variables; exhaust gas analysis and air pollution; carburetion; fuel injection; lubrication; engine performance; vehicle performance. Engine balance and vibrations. Electronic control.
Prerequisite(s): [(MMAE 321)] AND [(MMAE 322) OR (MMAE 323)]
(3-0-3)

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)]
(3-0-3)

MMAE 426
Nuclear, Fossil-Fuel, & 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): [(CHE 302) OR (MMAE 322) OR (MMAE 323)]
(3-0-3)

MMAE 430
Engineering Measurements

Introduction to applications of measurement instrumentation and design of engineering experiments. Generalized characteristics of sensors and measurements systems. Signal conditioning and computer-based data acquisition and analysis. Measurement of motion, force, strain, torque, shaft power, pressure, sound, flow, temperature and heat flux. Design of experiments proposals. Team-based projects addressing application of engineering measurements to a variety engineering problems. Effective communication of experimental results.
Prerequisite(s): [(PHYS 300)]
(2-6-4) **(C)**

MMAE 432
Design of Mechanical Systems

Small-group design projects drawn from industry. Requires senior standing.
Prerequisite(s): [(MMAE 304) OR (MMAE 306) OR (MMAE 332)]
(1-6-3)

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 322) OR (MMAE 323)]
(2-3-3) **(C)**

MMAE 434
Design for Mechanical Reliability

Reliability and hazard functions; statics and dynamic reliability models for series, parallel and complex systems; reliability allocation. Probabilistic design; stress and strength distributions; safety factors; loading random variables; geometric tolerances, linear and nonlinear dimensional combinations; stress as random variable; material properties as random variables; failure theories; significant stress-strength models; reliability confidence intervals.
Prerequisite(s): [(MMAE 332)]
(3-0-3)

MMAE 435
Design for Safety in Machines

A critical study of the interface between law and safety engineering, which embraces not only statutory law, such as OSHA and the Consumer Products Safety Act, but also case law arising from product liability suits. Detailed analysis of actual industrial and consumer accidents from the investigative stages through their litigation. Formulation of general safety design techniques for mechanical engineering systems and the development of courtroom communication skills for expert witnesses. Requires senior standing.
(3-0-3)

MMAE 436
Design of Aerospace Vehicles I

Aircraft design including aerodynamic, structural and power plant characteristics to achieve performance goals. Focus on applications ranging from commercial to military and from man-powered 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 304) OR (MMAE 306)] AND [(MMAE 311)] AND [(MMAE 312)]
(2-3-3) **(C)**

MMAE 437
Design of Aerospace Vehicles II

Spacecraft systems design including mission analysis and astrodynamics, 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 design to achieve specific mission requirements.
Prerequisite(s): [(MMAE 441 and MMAE 452)]
(2-3-3)

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 PHYS 300)]
(3-0-3)

MMAE 442
Aircraft & Spacecraft Response & Control

Aircraft lateral modes of motion and approximations; the yaw damper. Aircraft response to control and external inputs; introduction to automatic control. Spacecraft attitude control devices, gyroscopic instruments, momentum exchange and mass movement techniques, gravity gradient stabilization. Introduction to spacecraft automatic attitude control systems.
Prerequisite(s): [(MMAE 441)]
(3-0-3)

MMAE 443
Systems Analysis & 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 200) OR (MMAE 305)] AND [(MATH 252)]
(3-0-3)

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)]
(3-0-3)

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 306) OR (MMAE 332)]
(3-0-3)

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): [(MATH 350) OR (MMAE 350)]
(3-0-3)

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): [(MATH 252, MMAE 202, and MMAE 350)]
(3-0-3)

MMAE 452
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)]
(3-0-3)

MMAE 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 BME 455.
Prerequisite(s): [(BME 301) OR (MMAE 310) OR (MMAE 313)]
(3-0-3)

MMAE 463
Structure & Properties of Materials II
Continuation of MMAE 365. Solidification structures, diffusional and diffusionless transformations. Structure-property relationships in commercial materials.
Prerequisite(s): [(MMAE 365)]
(3-0-3)

MMAE 464
Physical Metallurgy
Principles of microstructure evolution with emphasis on phase transformations in metals and alloys. Processing-microstructure-property relationships. Fundamentals of alloy design for commercial applications.
Prerequisite(s): [(MMAE 361) OR (MMAE 365)]
(3-0-3)

MMAE 465
Electrical, Magnetic & 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)]
(3-0-3) **(C)**

MMAE 466
Microstructural Characterization of Materials
Advanced optical microscopy. Scanning and transmission electron microscopes. X-ray microanalysis. Surface characterization. Quantitative microscopy.
Prerequisite(s): [(MMAE 370)]
(2-3-3) **(C)**

MMAE 468
Introduction to Ceramic Materials
The structure and structure/properties relationships of ceramic materials. Topics include: crystal structure types; crystal defects; structure of class; phase equilibria and how these affect applications for mechanical properties; electrical properties; and magnetic properties. Sintering and ceramic reactions are related to microstructure and resultant properties.
Prerequisite(s): [(MS 201)]
(3-0-3)

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, MATH 251, and PHYS 221)]
(3-0-3) **(C)**

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 371) OR (MMAE 372)]
(3-0-3)

MMAE 473
Corrosion
Theory and prevention of corrosion of metals, including oxidation, sulphidation, other atmospheric attacks, aqueous corrosion, and other topics.
Prerequisite(s): [(MMAE 361 and MMAE 365)]
(3-0-3)

MMAE 474
Metal Processing
The principles and practice of (a) melting and casting processes; sand, die, investment, evaporative mold, and permanent mold casting processes; and (b) the heat treatment of carbon and low alloy steels, stainless steels, tool steels, cast irons, and selected non-ferrous alloys including titanium, aluminum and nickel base alloys.
Prerequisite(s): [(MMAE 463 and MMAE 464)]
(2-2-3) **(C)**

MMAE 476
Materials Laboratory II
Advanced synthesis, processing and characterization of metallic, non-metallic and composite materials. Experimental investigation of relationships between materials structures, processing routes and properties. Design of experiments/statistical data.
Prerequisite(s): [(MMAE 370)]
(1-6-3)

MMAE 478
Service Failure Analysis
Theory and analyses of materials failures.
(2-3-3)

MMAE 480
Forging & Forming
Mechanical and metallurgical basis for successful production of forgings and stampings. Forming limits, mechanical instability, plastic anisotropy, yielding and plastic flow rules.
(3-0-3)

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)]
(3-0-3)

MMAE 484
Materials & Process Selection
Decision analysis. Demand, materials and processing profiles. Design criteria. Selection schemes. Value and performance oriented selection. Case studies.
(3-0-3) **(C)**

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 371) OR (MMAE 372)]
(3-0-3)

MMAE 490
Crystallography & 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.
(3-0-3)

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)

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

Materials Science

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 122) OR (CHEM 124)]
(3-0-3)

Mathematics and Science Education

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.
(2-5-3) **(C)**

MSED 250
Middle & 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.
(3-0-3) **(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)]
(3-0-3) **(C)**

MSED 320
Inquiry & Problem Solving in Mathematics & 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)]
(3-0-3) **(C)**

MSED 350
Informal Education Practicum & Seminar
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)]
(2-5-3) **(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)]
(3-0-3) **(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, MSED 320, MSED 350, and MSED 400)]
(0-40-6) **(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.
(3-0-3)

MSED 497
Special Projects
Special projects.
(Credit: Variable)

Naval Science

Note
Naval Science courses are open to non-NROTC students with department approval. Courses marked with an asterisk (*) are not required for Marine Corps option students.

NS 101
Introduction to Naval Science
Composition and organization of the Naval Services; diverse missions, makeup and manning of naval sea services with emphasis on duties and responsibilities of officers, rank and enlisted rating structure, training of subordinates, promotion and advancement, and military courtesy. Students will gain a fundamental understanding of the formal and informal structures of the main warfare communities and how each contributes to attaining the U.S. Navy and Marine Corps mission.
(2-2-2)

NS 102
Naval Ships Systems I (Engineering)
Provides an elementary overview of Naval engineering systems and a detailed knowledge of the principles behind ship construction. Taught from a systems engineering standpoint. Topics include ship design, stability, and structural engineering; hydrodynamic forces; air and water systems; electrical theory, generation, and distribution systems; thermodynamics; damage control; hydraulics and ship control; theory and design of steam, nuclear, gas turbine, and diesel propulsion.
(3-2-3)

NS 201
Naval Ships Systems II (Weapons)
Theory and employment of the Navy's weapons, navigation, and communication systems. Processes of detection, evaluation, threat analysis, weapon selection, delivery, guidance, and explosives. Topics include fire control systems and major weapon types, including capabilities and limitations; physical aspects of radar and underwater sound. Supplemental review/analysis of case studies involving the moral and ethical responsibilities of leaders in employing weapons.
(3-2-3)

NS 202
Seapower & Maritime Affairs
A survey of U.S. naval and maritime history in the context of world maritime development, including the historical evolution of American sea power and the role of U.S. naval forces in an era of geopolitical change.
(3-2-3) **(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.
(3-2-3)

NS 302
Naval Operations & Seamanship
A continued study of relative motion, formation tactics, and ship employment. Also included are 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. The course is supplemented with a review/analysis of case studies involving moral/ethical/leadership issues pertaining to the concepts listed above.
(3-2-3)

NS 310
Evolution of Warfare
Evolution of western land warfare from 600 B.C. to present. Students develop understanding and knowledge of the classic principles of war, the changes in conduct of war through time, and the actions and decisions of battlefield commanders and their soldiers.
(3-2-3) **(C)**

NS 350
Naval Leadership Seminar
Offered as a supplement for Naval Science sophomores enrolled in Management 351; this course is a comprehensive seminar-style study of organizational behavior and management. The class meets biweekly for a total of five sessions to reinforce the fundamentals of Naval Leadership by focusing on a military setting for managerial case studies and issues. Topics include a survey of principal management functions. Major behavioral theories as well as practical applications are explored via student participation in case analysis and class discussion facilitated by the instructor. Issues that range from the most current ones facing professionals today, to historical references on leadership will be replicated on distributed handouts in class. Other topics include decision making, communication, responsibility, authority and accountability.
(3-0-0)

NS 401
Leadership & Management
Addresses leadership, management, and organizational behavior issues facing naval officers in a stressful environment, including strategic planning, time management, communication, counseling, team building, and decision making.
(3-2-3) **(C)**

NS 402
Naval Leadership & Ethics
An academic, discussion-oriented course intended to provide future leaders with a broad understanding of the various moral, ethical, and leadership philosophies that help strengthen junior-officer character.
(3-2-3) **(C)(E)**

NS 405
Leadership & Management Seminar
A six-hour seminar augmenting Theory of Organization and Management (MGT 353). 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 MGT 351, and in place of NS 401.
Corequisite(s): (MGT 351)
(1-0-0)

NS 410
Amphibious Warfare
Evolution of amphibious warfare from the battle of Marathon to present. Students develop understanding and knowledge of the evolution of amphibious warfare doctrine, the impact of significant events in history relating to amphibious operations, and the problems and advantages relative to employing amphibious forces in the modern era.
(3-2-3) **(C)**

NS 497
Special Topics
Provides midshipmen with an opportunity to work under the supervision of officer-instructor on projects related to proessional 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.
(0-2-0)

Philosophy

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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

PHIL 305
20th 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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

PHIL 336
Metaphysics
Metaphysics.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

PHIL 350
Science & 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)]
(3-0-3) **(C)(H)**

PHIL 351
Science & 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)]
(3-0-3) **(C)(H)**

PHIL 360
Ethics
A study of the fundamental issues of moral philosophy.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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, their 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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

PHIL 377
Communication Law & 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.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(3-0-3) **(C)(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)]
(3-0-3) **(C)(H)**

PHIL 491
Independent Study
Supervised individual research for advanced students.
Prerequisite(s): [(HUM 102) OR (HUM 104) OR (HUM 106)]
(Credit: Variable) **(C)(H)**

Physics

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. Open only to Physics majors.
(2-0-2) **(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.
(3-0-3)

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 149*) OR (MATH 151*)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(C)**

PHYS 200
Basic Physics for Architects
This class is a one-semester course primarily for students of architecture. The course will address the basic physical principles and concepts associated with structures and buildings. Although quantitative at times, the course will stress conceptual understanding and practical applications. Hands-on exercises will be conducted both in class, and out of class. Extensive web- based materials will be available in lieu of a textbook.
(4-0-4)

PHYS 211
Basic Physics I
Intended to give students in liberal arts, business, and psychology an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. This course does not satisfy graduation in any engineering or physical science program.
Prerequisite(s): [(MATH 122) OR (MATH 148) OR (MATH 151)]
(3-0-3)

PHYS 212
Basic Physics II
Intended to give students in the liberal arts, business, and psychology an understanding of the basic principles of physics and an appreciation of how the results of physics influence contemporary society. This course does not count for graduation in any engineering or physical science program.
Prerequisite(s): [(MATH 122) OR (MATH 148) OR (MATH 151)]
(3-0-3)

PHYS 213
Basic Physics Laboratory: Mechanics
Laboratory experiments in the areas of mechanics, heat, and wave motion.
Corequisite(s): (PHYS 211)
(0-3-1)

PHYS 214
Basic Physics Laboratory: Electromagnetism & Optics
Laboratory experiments in the areas of electromagnetism and optics.
Corequisite(s): (PHYS 211)
(0-3-1)

PHYS 221
General Physics II : Electricity & 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): [(PHYS 123 transfer credit) OR (PHYS 123* with min. grade of D)] An asterisk (*) designates a course which may be taken concurrently.
(3-3-4) **(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)]
(3-3-4)

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 221 transfer credit) OR (PHYS 221 with min. grade of D)]
(3-0-3)

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)]
(2-3-3) **(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)]
(2-3-3) **(C)**

PHYS 304
Thermodynamics & 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)]
(3-0-3)

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)]
(3-0-3)

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)]
(3-0-3)

PHYS 348
Modern Physics for Scientists & 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)]
(3-0-3)

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): [(MATH 251 and PHYS 308)]
(3-0-3)

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 348)]
(3-0-3)

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, PHYS 308*, and PHYS 348)]
An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

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)]
(3-0-3)

PHYS 410
Molecular Biophysics
Thermodynamic properties of biological molecules. Irreversible and open systems, information theory. Biophysical measurements. Structure and properties of proteins. Enzyme action. Structure and properties of nucleic acids. Genetics at the molecular level. Molecular aspects of important biological systems.
(3-0-3)

PHYS 411
Astrophysics
Celestial mechanics and planetary motion; stellar structure and evolution; energy generation in stars; theory of white dwarfs, pulsars (neutron stars), and black holes; quasars; cosmology, background microwave radiation, and the big bang model.
Prerequisite(s): [(PHYS 223) OR (PHYS 224)]
(3-0-3)

PHYS 412
Modern Optics & 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 348)]
(3-0-3)

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): [(MATH 252 and PHYS 308)]
(3-0-3)

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)]
(3-0-3)

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 348)]
(3-0-3)

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 348)]
(3-0-3)

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 348)]
(3-2-3) **(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 348)]
(2-3-3) **(C)**

PHYS 431
Nanoscience
An introduction to the study of phenoma at the nanoscale, including their physics, chemistry, biology, and materials science; synthesis and fabrication of nanomaterials and nanostructures; methods of characterization; nanoscale properties including quantum effects.
Prerequisite(s): [(CHEM 344) OR (PHYS 224) OR (PHYS 348)]
(3-0-3)

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 348)]
(3-0-3)

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, PHYS 308, PHYS 348, and PHYS 405)]
(2-3-3) **(C)**

PHYS 444
Physics for High School Teachers
Physics for high school teachers.
(1-0-1)

PHYS 445
Physics for High School Teachers
Physics for high school teachers.
(3-0-3)

PHYS 465
Electrical, Magnetic, & 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.
(3-0-3)

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)]
(1-0-1)

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) **(C)**

PHYS 497
Special Topics in Physics
Special topics in physics.
(Credit: Variable) **(C)**

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)

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

PHYS 501
Methods of Theoretical Physics I

PHYS 502
Methods of Theoretical Physics II

PHYS 505
Electromagnetic Theory

PHYS 507
Electrodynamics

PHYS 508
Analytical Dynamics

PHYS 509
Quantum Theory I

PHYS 510
Quantum Theory II

PHYS 515
Statistical Mechanics

PHYS 521
Quantum Electronics

PHYS 537
Solid State Physics I

PHYS 538
Solid State Physics II

PHYS 553
Quantum Field Theory

PHYS 561
Radiation Biophysics

PHYS 570
Introduction to Synchrotron Radiation

PHYS 571
Radiation Physics I

PHYS 572
Radiation Physics II

PHYS 573
Standards, Statutes and Regulations

PHYS 575
Case Studies in Health Physics

PHYS 576
Internal Dosimetry

PHYS 577
External Dosimetry

Political Science

PS 100
Introduction to the Profession: Political Science
Intended for first-year political science majors. The course exposes students to quasi-experimental methods, quantitative and qualitative approaches, the history of the profession, and career possibilities. Students will examine several fundamental works in the discipline.
(3-0-3) **(C)**

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.
(3-0-3) **(C)(S)**

PS 209
Research Methods for Social & Political Science
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. Same as SOC 209. This course does not fulfill the social science general education requirements, but it may be used as a free elective.
Prerequisite(s): [(BUS 221) OR (PSYC 203)]
(3-0-3) **(C)**

PS 210
Social & Political Thought
Examines central social and political theories and their ideas concerning such things as the relationship between individual and society, social harmony and conflict, social equality, and the role of the state. Same as SOC 210.
(3-0-3) **(C)(S)**

PS 230
International Relations
Examines relations among countries from the perspective of both the international system and the nation-state. Emphasis is placed on the transformation in the international system caused by weapons, production, and communication technologies. Special attention is given to the international policies of the United States toward various regions and its role in international organizations.
(3-0-3) **(C)(S)**

PS 232
Introduction to Comparative Politics
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.
(3-0-3) **(S)**

PS 273
Great Political Thinkers
Introduces students to the ideas of the world's great political philosophers. Plato, Aristotle, Hobbes, Locke, Rousseau, Marx, and others will be covered.
(3-0-3) **(C)(S)**

PS 299
Japanese for Social Scientists I
Serves as an introductory course in the Japanese language and is designed to focus on the vocabulary and skills most useful to students in the social sciences.
(3-0-3) **(S)**

PS 303
Politics & the Media
Analyzes the media's role in contemporary American politics and government. Emphasis is placed on how the media – newspapers, television, and electronic forms – manufacture the news and how the news influences political and government agenda, decision making, and public policies.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 306
Politics & Public Policy
Analyzes how social problems become public problems and how the government develops public policies and with what effect. Emphasizes the characteristics of the American policy-making process. Case studies are used to clarify the process.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 312
Analysis & Evaluation of Public Policy
Explores techniques of policy analysis and program evaluation having practical application in such fields as transportation, education, housing, criminal justice, and environmental quality. The course includes the research and analytical methods most frequently applied in governmental decision making.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 313
Comparing 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): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 314
Intergovernmental Relations & Federalism
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.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(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): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 316
Political Party Election Process
Examines election and campaigns from different perspectives, including the historical development of elections in the United States and other countries, the rules by which campaigns are governed, the strategies that candidates follow in pursuit of office, and the role of political parties.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(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): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 318
Contemporary Constitutional Issues
Examines how decisions about some of our basic rights are made. The course focuses on U.S. Supreme Court decisions in the areas of criminal law, desegregation, education, welfare, housing, and consumer law. Supreme Court decisions are read and supplemented by textual material.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 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 (in)effective 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 issues discussed.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 320
Urban Institutions
Examines the politics of social class, ethnicity, and race in American cities. Receiving particular attention are social welfare institutions and the rise and fall of manufacturing.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 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 relationship of social class to other features of society, some consequences of social stratification, and outlooks for the future of inequality in developed countries like the United States. Same as SOC 321.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

PS 323
Problems of Multi-Ethnic, Multi-Religious States
Focuses on the political challenges arising in multiethnic, multi-language, and multi-religious societies in which there has been substantial conflict or balkanization. Developed and developing countries receive attention.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 328
Vietnam War: Politics, Ideology, Societal Issues
Examines the politics, rationale, and societal conflicts relating to the Vietnam War and the impact of the war and related politics on current politics and current ideological disputes in the United States and Vietnam.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 329
Politics of Global Warming
Reviews politics and policies relating to global warming using a multi-disciplinary approach. Students look at its anthropogenic causes, impacts on human society, potential mitigation strategies, and policy responses. The course also examines the different issue areas connected to global warming: the environment; public safety; national security; economics; and national prestige.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 332
Politics of Science & 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): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 333
Politics of National Security
Examines the formulation and implementation of national security and military policy in the United States. The course surveys the emergence and growth of military strategy and the defense establishment, highlighting the impact of nuclear weapons on military strategy and security and the post-Cold War struggle over forces and missions.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 335
Issues in United States Space Policy
Examines the origins, evolution, current status, and future prospects of U.S. space policies and programs. The course provides students with an understanding of the governmental and non-governmental actors that make up the space policy community. Discussions are cast in the context of the space activities of other countries and of international competition and cooperation in space.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 338
Energy & Environmental Policy
Traces the economic and political implications of dependence on fossil fuels and the attempt to develop alternate energy sources and promote conservation. Assessed are the environmental effects of resource consumption and the effort to control these effects through increased efficiency and regulation of pollution. The course explores such problems as nuclear waste, acid rain, global warming, and deforestation, and examines national and international attempts at economic, political, and technological solutions.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 340
Social Organization & Control
Surveys theories explaining the organization and structure of complex societies. The problem of social control, or the capacity of society to regulate itself formally or informally according to its desired principles, is viewed as a central problem of social organization. Same as SOC 340.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

PS 341
School Politics
This course examines how urban public schools have been governed over time, who have been the principal beneficiaries of these governance arrangements, and how the governance arrangements have come into being. The course includes material on recent efforts as well as historical governance.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 345
The American Presidency
Surveys the evolution of the office and powers of the presidency as a result of historical forces, institutional factors, and the actions of those who have served as president. The course looks at the relationships of presidents with political parties, Congress, the bureaucracy, media, and the public, emphasizing both domestic and foreign policy.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(C)(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): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 353
The Promise & Problems of Policy
Analyzes the policymaking process, including both policy formulation and implementation. Subjects covered include the necessity for policy, environmental factors and their effect on policymaking, the policymaking process, and a brief introduction to methods of analysis. Same as SOC 353.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

PS 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. Same as SOC 354.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

PS 356
Law in American Society
Examines the nature of law and the legal system in American society. Special attention is paid to the institutions of the legal system, how they are supposed to function, and how they actually function. The courts, ranging from the U. S. Supreme Court to local trial courts, are studied.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 360
Globalization: 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): [One 200-level course in Political Science]
(3-0-3) **(C)(S)**

PS 361
Theories of Capitalism
Examines the sociological and political literatures on capitalism. Themes include labor value, bureaucratic theory, problems of exploitation, class conflicts, status anxiety, and the internationalization of capital. Same as SOC 361.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

PS 362
Technology & 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 SOC 362.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

PS 365
Introduction to Legal Analysis
Designed to provide upper-level undergraduate students with an introduction to legal analysis and effective legal writing through the preparation of a legal memorandum, judicial opinion, and other written assignments. For students interested in attending law school, this course bridges the gap between the undergraduate experience and law school.
Prerequisite(s): [One 200- level course in Political Science]
(3-0-3) **(C)(S)**

PS 372
Politics of 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): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 373
Politics of East Asia
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): [One 200-level course in Political Science]
(3-0-3) **(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): [One 200-level course in Political Science]
(3-0-3) **(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): [One 200-level course in Political Science]
(3-0-3) **(S)**

PS 376
Politics of Global Migration
Explores the economic, political, and humanitarian forces that are driving the complex phenomenon of contemporary global migration. The course examines the causes, lived experiences, and consequences of migration, working to acquire a sound understanding of its social, political, legal, and cultural dimensions.
Prerequisite(s): [One 200-level course in Political Science]
(3-0-3) **(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): [One 200-level course in Political Science or Sociology]
(3-0-3) **(S)**

PS 399
Japanese for Social Scientists II
A continuation of Japanese for Social Scientists I (PS 299).
Prerequisite(s): [(PS 299)]
(3-0-3) **(S)**

PS 401
Terrorism, Security & Civil Liberties
Acquaints students with the new kinds of organized violence, the theories and technology of terrorism, and possible policy responses. The impact of the responses to terrorist threats on individual freedom, civil liberties, and security are closely examined, along with normative issues associated with increases in governmental monitoring and control over individuals.
Prerequisite(s): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(C)(S)**

PS 403
Issues in Urban Affairs
Covers selected issues in contemporary urban politics and policy. The seminar serves as the required capstone course for the Urban Affairs specialization. Same as SOC 403.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(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): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(C)(S)**

PS 420
Comparative Urban Politics
Compares major urban systems in a variety of settings in both developed and developing countries. The seminar gives special attention to political and economic factors shaping urbanization processes and distinctive policy issues in these different settings.
Prerequisite(s): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(S)**

PS 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 interorganizational networks, and the role of power in organizational life. Same as SOC 422.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(S)**

PS 438
Energy & Environmental Policy
Places energy and environmental policy in domestic and global context. The seminar traces the economic and political implications of dependence on fossil fuels, the attempt to develop alternate energy sources and promote conservation, the environmental effects of resource consumption, and the effort to control these effects through increased efficiency and regulation of pollution. Explored are such problems such as nuclear waste, acid rain, global warming, and deforestation.
Prerequisite(s): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(S)**

PS 440
Issues in Globalization
Examines globalization, which has become a buzzword in social science and in popular discourse. This seminar investigates the economic, socio-political, and cultural aspects of globalization, laying the stress on theoretical debates in the field of political economy.
Prerequisite(s): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(C)(S)**

PS 453
U.S. Regulatory Politics & Policy
Examines the changing role of government regulation of private and public activities from a political and administrative perspective, from the Progressive Era to the present. The seminar investigates the regulatory process, including administrative law, standards for rule- making, and the involvement of organized groups and the courts.
Prerequisite(s): [One 200-level and one 300- level course in Political Science]
(3-0-3) **(C)(S)**

PS 455
Political Sociology
Surveys major issues and problems in the field of political sociology. Topics include the forms of political power structures, elitist approaches to politics, community and national power structures, and political socialization. Same as SOC 455.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(S)**

PS 462
Issues in American Politics
Intended to develop knowledge and analytical skills to assess how well our government works and how it might work better. The seminar focuses on the following: the operation of the federal executive, legislative, and judicial institutions; the policymaking process (including the role of administrators); and the power exercised by organized groups, experts, and the media. This seminar serves as the required capstone course for the American and Comparative Politics specialization.
Prerequisite(s): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(C)(S)**

PS 465
Political Economy
Introduces students to advanced theories of political economy, exploring the relationship between the economy and the political system. The impact of economic ideologies will be examined, as will the structure of political and economic interests and the mediating effects of institutions on outcomes.
Prerequisite(s): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(C)(S)**

PS 480
Modeling Complexity
Acquaints students with agent-based modeling and other techniques for understanding the behavior of complex systems. Students learn to construct and test models linking individual behavior and the interaction of individuals to social structures and group behaviors. Same as SOC 480.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(C)(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): [One 200-level and one 300-level course in Political Science]
(3-0-3) **(C)**

PS 495
Power & Domination
Uses concepts learned in political science and sociology classes and brings them to bear on the topic of power and domination with the obvious concomitant of resistance. The seminar serves as the required capstone course for the Society, Politics, and Value specialization. Same as SOC 495.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(S)**

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.
Prerequisite(s): [One 200-level and one 300-level course in Political Science]
(Credit: Variable) **(C)(S)**

Psychology

PSYC 100
Introduction to the Profession I
Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools.
(2-0-2) **(C)**

PSYC 101
Introduction to Profession II
Topics include problem formulation and career opportunities, spreadsheets and relevant computer applications, as well as data search tools.
(2-0-2) **(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.
(3-0-3)

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)]
(2-2-3) **(C)(N)**

PSYC 221
Human Behavior, Growth & Learning
This is one of two courses intended to introduce basic topics in psychology; they can be taken either independently or in sequence. The survey includes overviews of clinical psychology, social psychology and personality. Experimental design and ethical issues will also be addressed.
(3-0-3) **(C)(S)**

PSYC 222
Brain, Mind & Behavior
This one of two courses intended to introduce basic topics in psychology; they can be taken either independently or in sequence. The survey includes overviews of cognition, intelligence, neuroscience, aging and development, as well as controversies in experimental design and ethics.
(3-0-3) **(C)(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.
(3-0-3)

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.
(3-0-3) **(C)(S)**

PSYC 303
Abnormal Psychology
Overview of various cognitive, emotional, and behavioral disorders, focusing on diagnostic criteria, causal factors, and treatment, and emphasizing scientific, research- oriented perspectives.
Prerequisite(s): [(PS 190-298) OR (PSYC 190-299) OR (SOC 190-299)]
(3-0-3) **(C)(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.
(3-0-3) **(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.
Prerequisite(s): [(PSYC 221) OR (PSYC 222)]
(3-0-3) **(S)**

PSYC 406
History & Systems of Psychology
Historical development of influential psychological systems: structuralism, functionalism, behaviorism, psychoanalysis, and Gestalt psychology. Requires 12 hours of psychology. Open only to Psychology majors.
Prerequisite(s): [(PSYC 221, PSYC 222, and PSYC 301) OR (PSYC 221, PSYC 222, and PSYC 303) OR (PSYC 221, PSYC 301, and PSYC 303) OR (PSYC 222, PSYC 301, and PSYC 303)] AND [(PSYC 203) OR (PSYC 204) OR (PSYC 409)]
(3-0-3) **(S)**

PSYC 409
Psychological Testing
Survey of current group tests, emphasizing basic concepts, e.g., validity and reliability, as well as practical applications and measurement techniques.
Prerequisite(s): [(PSYC 203, PSYC 221, and PSYC 222)]
(3-0-3)

PSYC 410
Vocational Rehabilitation
Historical, philosophical and legal bases of rehabilitation. Study of vocational, independent living, public and private rehabilitation, service delivery systems, and roles and functions of the practitioner.
Prerequisite(s): [(PSYC 221)]
(3-0-3) **(C)(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) OR (PSYC 222)]
(3-0-3) **(N)**

PSYC 412
Multicultural & Psychosocial Aspects of Disability
Review of diversity issues in rehabilitation, including culture, disability, gender, aging, socio-economic status, and spirituality and religion. Study of individual and family adaptation and coping processes following disability; psychological and sociological consequences of disability; attitudes toward persons with disabilities; impact of social and environmental barriers. One of two-course sequence.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(C)(S)**

PSYC 414
Physiological Psychology
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 and PSYC 222)]
(3-0-3) **(N)**

PSYC 420
Single Subject Design & Applied Behavior Analysis
Single-subject experimental designs for the evaluation of environmental variables on behavior of individuals. Applied behavior analysis, precision teaching, and frequency measures for logical inference. Ethical, logical, scientific, and practical aspects of real-world experimentation for optimizing performance or learning in education, treatment, and training.
(3-0-3) **(S)**

PSYC 423
Learning Theory
Seminar course examining major areas of research in learning theory, starting with the behavorists and gestalt psychologists, and working up to modern examinations of memory, metacognition, evolutionary psychology and social modeling.
Prerequisite(s): [(PSYC 222)]
(3-0-3) **(C)(S)**

PSYC 426
Cognitive Processes
This is a seminar course examining major areas of research in cognitive psychology, including attention, perception, memory, language, problem solving and creativity. Focus within these areas will vary depending on student interest, but throughout the semester we will be drawing connections between the study of the human mind and real-world applications in multiple fields.
Prerequisite(s): [(PSYC 222)]
(3-0-3) **(S)**

PSYC 431
Measurement of Attitudes
Survey of methods used in attitude scale construction. Development and use of such scales. Multidimensional scaling.
Prerequisite(s): [(PSYC 203)]
(3-0-3)

PSYC 435
Early Development
Processes and theories of mental, social, emotional and physical development of infants, children and adolescents. Requires 9 hours of psychology.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(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 222)]
(3-0-3) **(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): [(PSYC 410, PSYC 411, PSYC 412*, and SOC 480)] An asterisk (*) designates a course which may be taken concurrently.
(3-0-3)

PSYC 452
Personality Theory
Survey of personality theories and their application to everyday life.
Prerequisite(s): [(PSYC 221 and PSYC 222)]
(3-0-3) **(S)**

PSYC 455
Development & 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)]
(3-0-3) **(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 and PSYC 222)]
(3-0-3) **(S)**

PSYC 481
Groups & 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)]
(3-0-3) **(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 204, PSYC 221, and PSYC 222)]
(1-2-3)

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 204, PSYC 221, and PSYC 222)]
(1-2-3)

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. Requires senior standing.
(3-0-3)

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. Requires senior standing.
(3-0-3)

PSYC 487
Integrative Psychology Seminar I
A synthesis of issues and areas in psychology. Requires 21 credit hours in psychology. Requires junior standing.
Prerequisite(s): [(PSYC 203)]
(3-0-3)

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. Requires junior standing.
(3-0-3)

PSYC 489
Undergraduate Psychology Seminar
Reports and discussion of current problems and issues in psychology.
Prerequisite(s): [(PSYC 204, PSYC 221, and PSYC 222)]
(3-0-3) **(S)**

PSYC 497
Special Problems
Independent study involving compilation and analysis of data bearing on a significant problem. Requires junior standing.
(Credit: Variable)

GRADUATE COURSES
Graduate courses are available to degree-seeking undergraduate students with the approval of the course instructor and faculty advisor. See the current ***IIT Bulletin: Graduate Programs*** for full descriptions.

PSYC 501
Physiological Foundation of Behavior

PSYC 502
Social Bases of Behavior

PSYC 503
Learning, Cognition and Motivation

PSYC 504
Individual and Cultural Differences

PSYC 513
Assessment in Rehabilitation Counseling

PSYC 523
Introduction to Theories of Psychotherapy

PSYC 529
Personnel Selection and Evaluation

PSYC 545
Graduate Statistics I

PSYC 556
Organizational Psychology

PSYC 557
Pre Practicum in Rehabilitation Counseling

PSYC 561
Applied Counseling Techniques

PSYC 562
Job Placement

PSYC 563
Human Growth and Career Development

PSYC 583
Rehabilitation Engineering Technology I: Survey of Interdisciplinary Application of RET

PSYC 590
Psychiatric Rehabilitation

Sociology

SOC 200
Introduction to Sociology
Introduces students to the structure and operation of society. The course analyzes individual behavior and emphasizes social problems.
(3-0-3) **(C)(S)**

SOC 203
Engaging Sociology: Ethnography
Has students read various ethnographic studies and prepare assignments that apply the associated concepts and insights: taking photographs; bringing in music and film clips; writing comedy sketches and fictional blog entries; illustrating political cartoons; and designing spaces, devices, and clothing that manifest or illuminate the topics at hand.
(3-0-3) **(S)**

SOC 205
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.
(3-0-3) **(C)(S)**

SOC 209
Research Methods for Social & Political Science
Introduces students to explanation in the social sciences and both qualitative and 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. Same as PS 209. This course does not fulfill the social science general education requirements, but it may be used as a free elective.
Prerequisite(s): [(BUS 221) OR (PSYC 203)]
(3-0-3) **(C)**

SOC 210
Social & Political Thought
Examines central social and political theories and their ideas concerning such things as the relationship between individual and society, social harmony and conflict, social equality, and the role of the state. Same as PS 210.
(3-0-3) **(C)(S)**

SOC 211
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.
(3-0-3) **(S)**

SOC 212
Contemporary Social Problems
Investigates various "social problems" and how they came to be defined as problematic. The course covers such general sociological concepts and theoretical perspectives as symbolic interactionism, conflict theory, structural functionalism, and constructionism. Students also examine the role of state advocates and the media in defining social problems. Case studies illustrate how different theoretical perspectives lead to different "solutions" and policy recommendations.
(3-0-3) **(C)(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): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 302
Science & 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): [One 200-level course in Sociology]
(3-0-3) **(C)(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): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 308
Social Psychology & 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.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 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 relationship of social class to other features of society, some consequences of social stratification, and outlooks for the future of inequality in developed countries like the United States. Same as PS 321.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

SOC 340
Social Organization & Control
Surveys theories explaining the organization and structure of complex societies. The problem of social control, or the capacity of a society to regulate itself formally and informally according to its desired principles, is viewed as a central problem of social organization. Same as PS 340.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

SOC 342
Industrial Society
Analyzes social issues of particular relevance to scientists and engineers: demographic trends and their effects on schools, labor markets, workplaces, and other institutions; the changing role of the United States in the global economy; the impact of changing technology on work and employment; and the shift to a service economy.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 348
Deviant Behavior & 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): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 350
Urban Sociology
Examines the historical origins of cities and their present place in society and culture. Important themes include: the impact of industrialization and globalization; the significance of racial, ethnic, and economic structures; and the consequences of residential segregation and alternative physical structures in urban areas.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 351
Sociology of Work
Begins with a brief comparison of the nature, role, and meaning of work across time and space. The course continues with a survey of some of today's most important topics in the study of work, primarily looking at the United States and other developed countries.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 352
Sociology of Education
Analyzes the organization and purpose of schooling in American society, including the historical development of American education, the relationship of schooling to life chances and individual success, the bureaucratic characteristics of schooling, contemporary problems facing American education, and how the U.S. educational system compares with those of other societies.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 353
The Promise & Problems of Policy
Analyzes the policymaking process, including both policy formulation and implementation. Subjects covered include the necessity for policy, environmental factors and their effect on policy-making, the process of policymaking, and a brief introduction to methods of analysis. Same as PS 353.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

SOC 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. Same as PS 354.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

SOC 356
Transformative Technologies
Focuses on major technological innovations and charts the social transformations that have historically accompanied their introduction. Examples include writing, the plow, the clock, the automobile, and the computer. Attention is directed to issues of institutional interdependence, the question of technological determinism, and Luddism/resistance.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 359
Humans, Ecology, & Environment
Examines the relationship between humans and nature, including reasons for some well-known ecological catastrophes in human history. The course traces changing attitudes to the environment and explores various measures that have been offered to solve problems, for instance, the Green Revolution, sustainable development, renewable energy, "clean" technologies, and the potential social and ecological consequences of these solutions.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 361
Theories of Capitalism
Examines the sociological and political literatures on capitalism. Themes include labor value, bureaucratic theory, problems of exploitation, class conflicts, status anxiety, and the internationalization of captial. Same as PS 361.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(C)(S)**

SOC 362
Technology & 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): [One 200-level course in Political Science OR One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 371
Occupations & Professions
Considers all factors affecting work, including the transition from school to work, the determinants of earnings and other job benefits, job satisfaction, labor unions and professional associations, class position in American society, the effects of foreign competition, government labor market policies, and the work environment in a comparative perspective.
Prerequisite(s): [One 200-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 385
Topics in Social Science
Investigates a topic of current interest in Sociology which will be announced by the instructor when the course is scheduled.
Prerequisite(s): [One 200-level course in Political Science or Sociology]
(3-0-3) **(S)**

SOC 403
Issues in Urban Affairs
Covers selected issues in contemporary urban politics and policy. The seminar serves as the required capstone seminar for the Urban Affairs specialization. Same as PS 403.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(S)**

SOC 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 an organization and its environment, the importance of interorganizational networks, and the role of power in organizational life. Same as PS 422.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(C)(S)**

SOC 431
Development of Sociological Thought
Surveys ideas and issues that have influenced the history of sociology and continue to bear significantly on current theory. The seminar analyzes major figures, schools of thought, conceptual themes, and controversies.
Prerequisite(s): [One 200-level and one 300-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 442
Race & Ethnicity in International Perspective
Examines the conceptual construction of race and ethnicity in different societies around the world in various eras. The seminar pays special attention to the causes and consequences of racial and ethnic conflict and cooperation for cultural groups and for public policy.
Prerequisite(s): [One 200-level and one 300-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 454
Gender & Work Through Film
Examines the ways that gendered expectations and the opportunities based on them translate into workplace realities for women and men. The goals of the seminar are to introduce students to the sociological study of gender and work and to help develop the observational and analytical skills necessary to understand what is going on in today's workplace.
Prerequisite(s): [One 200-level and one 300-level course in Sociology]
(3-0-3) **(C)(S)**

SOC 455
Political Sociology
Surveys major issues and problems in the field of political sociology. Topics include the forms of political power structures, elitist approaches to politics, community and national power structures, and political socialization. Same as PS 455.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(S)**

SOC 480
Modeling Complexity
Acquaints students with agent-based modeling and other techniques for understanding the behavior of complex systems. Students learn to construct and test models linking individual behavior and the interaction of individuals to social structures and group behaviors. Same as PS 480.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(C)(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): [One 200-level and one 300-level course in Sociology]
(3-0-3) **(C)**

SOC 495
Power & Domination
Uses concepts learned in political science and sociology classes and brings them to bear on the topic of power and domination with the obvious concomitant of resistance. The seminar serves as the required capstone course for the Society, Politics, and Value specialization. Same as PS 495.
Prerequisite(s): [(One 200-level course and one 300-level course) in Political Science or Sociology]
(3-0-3) **(S)**

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): [One 200-level and one 300-level course in Sociology]
(Credit: Variable) **(C)(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.
Prerequisite(s): [One 200-level and one 300-level course in Sociology]
(3-0-3) **(S)**

Academic Policies and Procedures

Academic Policies and Procedures

Academic Loads

The average full-time academic load during the fall or spring semester is approximately 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 9 to 11 credit hours must obtain permission from their academic dean.

Students who wish to enroll in more than two courses during the summer term must obtain permission from their academic dean.

Non-degree students requesting a course overload (more than 8 credit hours) must obtain permission from the Office of Undergraduate Academic Affairs.

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 semester hours, 90 semester hours for architecture students. Students may request an official academic audit through the Academic Affairs channel in the IIT Portal.

Students may also review academic progress towards their degree through the DegreeWorks channel in the IIT portal.

Academic Progress, Probation, and Dismissal

All students who are degree candidates are expected to maintain satisfactory academic progress. This includes earning satisfactory grade point averages and maintaining a satisfactory rate of progress toward the completion of their degree programs.

Students who do not earn at least a 2.00 cumulative GPA, a 1.85 current 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 advisor, department associate chair, and academic dean. Probation may affect financial aid (see Continued Eligibility for Financial Assistance on page 18).

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.

Academic probation may affect a student's eligibility to participate in varsity athletic sports.

Students who are on academic probation for two consecutive semesters are candidates for dismissal from IIT.

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 being dismissed.

A student dismissed by the university can petition the Academic Standing Committee to review the dismissal. The student must present substantial academic or other relevant new evidence not available at the time of dismissal 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 advisor 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 advisors when questions arise.

Departmental associate chairs and advisors 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 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 DegreeWorks. Students may access the DegreeWorks channel through the IIT portal.

An advisor 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 obtain a Change of Major form from the Office of Undergraduate Academic Affairs or at **www.iit.edu/ugaa**. 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 (or pre-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 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 submit a new application for admission to the Office of Undergraduate Admission. Students must have completed at least one semester of relevant coursework at IIT 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 admission to the Office of Undergraduate Admission.

Code of Academic Honesty

IIT 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 IIT Student Handbook and all students are expected to know and adhere to this code.

Credit by Examination

Credit may be earned through one or more of the following examination procedures. Total credit from proficiency examinations and CLEP may not exceed 18 semester hours. There is no limit for advanced placement credit.

Advanced Placement Program

Students who take the AP examinations need to have their official scores sent to IIT. Acceptable credit varies by subject and score. See **www.iit.edu/ugaa** for a list of AP examinations and IIT equivalencies.

College Level Examination Program (CLEP)

For these examinations, which are administered by the College Entrance Examination Board, IIT will award credit under the following conditions:

- The CLEP examination and the score achieved meet the standards of the IIT department that offers courses in the area of the examination.
- The CLEP examination is taken before the student enters IIT.
- 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 IIT.

Proficiency Examinations

Any student who believes that, through self-study or outside experience, he or she has 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 semester hours of enrollment at IIT. 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.

Dean's List

Every semester the names of all undergraduate students who have completed at least 12 graded hours with a semester grade point average of 3.50 or better appear on the Dean's List.

Grades

Grade	Grade Description	Instructor Assigned	Performance Evaluated	Attempted Hours	Earned hours	Quality Points	Quality Hours	GPA Hours	FinAid Hours
A	excellent	✓	✓	✓	✓	4.00	✓	✓	✓
B	above average	✓	✓	✓	✓	3.00	✓	✓	✓
C	average	✓	✓	✓	✓	2.00	✓	✓	✓
D	below average	✓	✓	✓	✓	1.00	✓	✓	✓
E	fail	✓	✓	✓		0.00	✓	✓	✓
I	incomplete	✓		✓		0.00			✓
R	research	✓		✓		0.00			✓
NA	non-attendance	✓		✓		0.00			✓
S	satisfactory	✓	✓	✓		0.00			✓
U	unsatisfactory	✓	✓	✓		0.00			✓
AU	audit					0.00			
W	withdrawal*			✓		0.00			
X	no grade submitted			✓		0.00			
NG	non-graded					0.00			

* Student Initiated

Grade Notes

X Temporary administrative grade automatically applied to blank grade rosters at grading deadline.

AU Grade basis elected by student at point of registration. A *Request to Audit Form* must be submitted at the time of registration and courses may not be changed to or from audit after registration. There is no credit given for an audited course. Regular tuition rates apply.

I This temporary grade requested in writing of instructor, by student, prior to week of finals, is posted by the instructor when regular grades are posted. The student must have substantial equity in the course with no more than four weeks of coursework remaining to be completed. The written agreement between the student and instructor must detail the remaining requirements to complete the course. A grade of I will be assigned only in case of illness or for unusual or unforeseeable circumstances that were not encountered by other students in the class and that prevent the student from completing the course requirements by the end of the semester. Grade of I will automatically change to E on the published deadline of the subsequent term.

R Temporary grade indicating course work is scheduled to extend beyond the end of term. Grade of R has same impact as I until final letter grade is submitted. Does not expire or change to another grade.

NA Apparent withdrawal due to non-attendance.

W Permanent administrative grade automatically applied when student withdraws before deadline (60% of term). Grade of W does not affect GPA. No credit hours are awarded for a grade of W.

NG Grade basis for a course in which no evaluation is recorded. Permanent administrative grade automatically applied.

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 Registrar's Office to a final letter grade of: A, B, C, D, E or S/U, or 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. Changes to final grades cannot be made once a degree has been posted for the career in which the course was taken, or in the case of a student's voluntary separation from the University.

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 semester hours. Graded semester hours include courses graded A, B, C, D, and E. All courses taken at IIT apply to the cumulative GPA, including those that do not apply toward graduation.

Repeating Courses for a Grade Change

Undergraduate students may repeat a course for a change of grade. A request to repeat a course for a change of grade must be submitted through DegreeWorks, the online degree audit system, during registration. Both grades will be recorded on all transcripts issued. 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. The course repeat policy is as follows:

- A course repeated for a grade change must be taken within one calendar year after initial enrollment in that course or the next time it is offered (whichever is longer).
- The same course may be repeated only once for a change of grade.
- No more than three courses may be repeated for a grade change in a student's career.
- Re-registration for courses in which a student received a passing grade requires the approval of the student's academic advisor and academic dean.
- If a course is no longer offered by the university, the provision to repeat the course for a grade change does not apply.

Graduate Course Enrollment Approval

An undergraduate degree-seeking student who wishes to enroll in a graduate 500-level course must first obtain written approval from the course instructor and faculty advisor stating that the student is qualified. This approval must be presented at the time of registration. An undergraduate non-degree student may be allowed to enroll in a graduate 500-level course in certain instances, but will require the permission of the Office of Undergraduate Academic Affairs. All undergraduate students who enroll in graduate courses are governed by the graduate grading system for those courses.

Graduation Requirements

Every student is responsible for fulfilling graduation requirements as specified in the IIT Bulletin in effect at the time of his or her admission to IIT. If those curriculum requirements change before the student completes a specified degree program, he or she may follow a curriculum in a subsequent IIT Bulletin with the approval of his or her academic unit head. When an earlier curriculum is no longer available, the individual degree program of a student who has been following this earlier curriculum will be modified by his or her 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 his or her academic program.

NOTE: Students must file an Application for Graduation Form with the Office of Undergraduate Academic Affairs at the beginning of the semester in which they plan to graduate. Failure to do so may result in the postponement of the student's graduation. Please refer to the IIT calendar on page 3 for specific deadlines.

Undergraduate students must complete:

- All required courses in their major program
- Credit hour requirements as appropriate to their major (a minimum of 126 hours)
- General education and special academic requirements as shown on page 25
- Residence requirements as outlined on page 261
- A minimum cumulative grade point average of 2.00 and a minimum grade point average of 2.00 in the student's major department courses. A student who completes all course requirements with an average below the minimum grade point requirements may, with permission of his or her department chair and academic dean, take additional courses to raise the grade point average
- Completion of all the above within a period of eight calendar years from the semester of initial admission for full-time students or twelve 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
- Payment of all financial obligations to the university

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.

Graduation with Honors

A student must complete a minimum of 60 graded semester hours at IIT in order to receive the award of "summa cum laude", "magna cum laude", or "cum laude". A student who has a grade point average of 3.90 and higher will graduate with "summa cum laude" honors; a student who has a grade point average between 3.80-3.89 will graduate with "magna cum laude" honors; and a student who has a grade point average between 3.50-3.79 will graduate with "cum laude" honors.

Leave of Absence

Undergraduate degree-seeking students who wish to withdraw from the university with the intention of returning to complete their degree program may apply for a Leave of Absence. All requests for a Leave of Absence begin with the Office of Undergraduate Academic Affairs. This designation cannot exceed one academic year, however, it may be extended if the proper documentation is submitted.

Students on a medical Leave of Absence may be required to contact the Counseling Center and submit documentation relating to treatment prior to resuming their studies.

International students must comply with additional regulations when requesting a Leave of Absence. See **www.iit.edu/∼internat** for additional details.

The leave of Absence policy is explained in more detail in the IIT Student Handbook.

Return from Leave

Students wishing to Return from Leave should contact the Office of Undergraduate Academic Affairs (**ugaa@iit.edu**) to begin the process. Students who have been away from IIT for more than 2 years will be processed for Readmission by the Office of Undergraduate Admission. The request for Return from Leave and all supporting documents must be submitted prior to the deadline specified on the IIT Calendar (see page 3).

Students must submit official transcripts from all colleges and universities attended since last enrolled at IIT. In some cases, additional interviews may be required to process a Return from Leave or Readmission.

International students must contact the International Center in addition to submitting a request to return from leave. See **www.iit.edu/∼internat**.

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 contact the Dean of Students and the Director of Undergraduate Advising.

Registration Appointments

Undergraduate students are allowed to register for an upcoming term based on their student classification. Appointment dates to begin registration are assigned on a priority basis to fifth-year undergraduates on the first day of registration, fifth- and fourth- year undergraduates on the second day of registration, and so on. Open registration begins once first-year students are allowed to register on the fifth day of the registration period

Registration Holds and Controls

Students with unpaid balances, disciplinary sanctions, unmet immunization requirements, or other such conditions to 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 advisor, 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 **www.iit.edu/registrar/registration_tools**.

Residence Requirements

All undergraduate degree-seeking students must observe the following residence requirements:

- Once enrolled at IIT, 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 IIT must be repeated at IIT. No transfer credit will be awarded for any course equivalent to a course failed at IIT.
- The final 45 semester hours of work must be completed in residence at IIT. 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 IIT in order to be eligible for a bachelor's degree from IIT.

Second Bachelor's Degree

A student whose first degree is granted by IIT must complete a minimum of 15 additional credit hours at IIT. A student whose first degree was awarded by another institution must complete a minimum of 45 additional credit hours at IIT. All other graduation requirements apply for the second degree. The GPA required for "summa cum laude", "magna cum laude", and "cum laude" for the second degree includes all IIT coursework.

Student Academic 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 an academic petition to the Office of Undergraduate Academic Affairs prior to the registration at another institution to guarantee transfer of credit according to guidelines on page 12.

Student Classification

The following table describes classifications for undergraduate students currently in effect at 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+

Transcripts

Official Transcripts are requested through the Office of the Registrar and are only released with the expressed consent and authorization of the student, in compliance with (FERPA) the Family Educational Rights and Privacy Act of 1974. 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 after the student has fulfilled all financial obligations to the university. Official Transcripts issued directly to the student making the request are stamped "ISSUED TO STUDENT". A fee is charged for each transcript issued.

Withdrawal from the University

Undergraduate degree-seeking students who withdraw from all of their courses are in effect withdrawing from the university. Non-attendance does not imply withdrawal. All requests for withdrawal begin with the Office of Undergraduate Academic Affairs which will provide assistance with the successful resolution of all outstanding obligations to the university.

International Students must comply with additional regulations when withdrawing from the university. See **www.iit.edu/∼internat**.

Any undergraduate student who is not in attendance for a semester must apply for reinstatement in the Office of Undergraduate Academic Affairs.

Reinstatement and Readmission

Students who have withdrawn and now wish to return to IIT should contact the Office of Undergraduate Academic Affairs (**ugaa@iit.edu**) to begin the process. Students who have been away from IIT for more than 2 years will be processed for Readmission by the Office of Undergraduate Admission. The request for Reinstatement or Readmission must be submitted prior to the deadline specified on the IIT Calendar (see page 3).

Students must submit official transcripts from all colleges and universities attended since last enrolled at IIT. In some cases, additional interviews may be required for Reinstatement/Readmission.

International students must contact the International Center in addition to submitting an application for Reinstatement/Readmission. See **www.iit.edu/∼internat** for more information.

Campus Resources

Campus Resources

Academic Resource Center

Web site: arc.iit.edu

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 and the sciences on a drop-in basis.

Undergraduate and graduate peer tutors are available during the fall and spring semesters. In addition to peer tutoring, the ARC also offers exam reviews, group study space, and an OTS computer laboratory.

The ARC is located in the southwest corner of the Hermann Hall Building. The ARC is open Monday through Thursday 10:00 a.m. to 8:00 p.m., Friday, 10:00 a.m. to 3:00 p.m., and Sunday from 6:00 p.m. to 9:00 p.m. For more details, visit the ARC website: **arc.iit.edu** or call 312.567.5216.

Athletics and Recreation

Web site: www.illinoistechathletics.com

The Department of Athletics and Recreation offers a comprehensive program of varsity sports, intramural competition, instruction, and informal recreational activities for both men and women. The Scarlet Hawks men's varsity teams compete in intercollegiate baseball, cross-country, soccer, and swimming; women's varsity teams compete in cross-country, swimming, soccer, and volleyball. The university is an active member of the National Association of Intercollegiate Athletics (NAIA).

The Office of Intramurals and Recreation offers a variety of activities for non-varsity athletes through the intramurals and club sports. These include basketball, flag football, raquetball, badminton, soccer, tennis, volleyball, track, water polo, rugby, softball, handball, and ultimate frisbee. Health and fitness classes include yoga, Pilates, belly dance, tai chi, qigong, and zumba. Special events and unique recreational programs like the Heptathlon of Hoops™ are also available. In addition, we offer instructional sports classes, open swimming, and open free-play activities.

IIT has the only disc golf course in Chicago proper, which gives our students a distinctive recreational advantage and makes our university a population destination for local area disc golf enthusiasts.

Career Management Center

Web site: www.cmc.iit.edu

Located on the upper level of the Galvin Library, the Career Management Center (CMC) offers individual career advising and testing, résumé critiques, job search assistance, mock interviews, and labor market and salary data. The CMC also administers the Cooperative Education and Internship Programs, whereby qualified students gain experience in their field of study prior to graduation. Both programs are options for domestic and international students at the undergraduate and graduate levels.

The CMC conducts a variety of professional development workshops on topics including résumé and cover letter writing, job search strategies, and interviewing skills. The CMC also hosts biannual career fairs, employer information sessions, and on-campus interviews. Career related resources, articles, workshop schedules, and a link to job postings may be accessed by students and alumni registered in NACElink (**www.cmc.iit.edu**). Individual sessions with a career counselor may be scheduled by appointment at 312.567.6800.

Cooperative Education Program

Cooperative education is a learning approach that integrates college studies with professional work experience in industry, business, or government. Salaries among IIT co-op students are competitive and help defray educational expenses. The co-op experience improves employment opportunities upon graduation. Full-time IIT students who are in their second through fifth semesters at IIT and who have and maintain at least a 2.5 GPA are eligible to participate in the co-op program. Students with a GPA lower than 2.5 may participate in the co-op program only with the permission of the Vice Provost for Undergraduate Affairs. Email **ugaa@iit.edu** for more information.

Interested students must attend an Introduction to Cooperative Education and Internship Workshop conducted by the CMC.

For more information, contact the CMC at 312.567.6800 or visit their website: **www.cmc.iit.edu**.

Part-Time Employment

Part-time employment opportunities may be available for students both on and off campus. Positions include career related co-ops or internships, Federal Work Study jobs, part-time, or seasonal work. Co-ops, internships, and on campus jobs are posted in the Career Management Center (CMC) NACElink database. Students interested in and eligible for employment off campus in their field of study can get job search assistance from the CMC and must attend an Introduction to Cooperative Education and Internship Workshop conducted by the CMC. Workshop schedules are posted at **www.cmc.iit.edu**. Appointments for individual career advising may be made by calling 312.567.6800.

International students (on F1 visa) are restricted to on-campus employment for their first academic year of study at any school in the United States. After completing one academic year in the country, students on an F1 visa may be eligible for employment opportunities off-campus, related to their field of study, through the Cooperative Education or Internship Programs.

Communication Across the Curriculum Program

Web site: www.iit.edu/cac

The CAC helps students understand the role of writing and speaking in their academic and professional lives. Both on its website (**www.iit.edu/cac**) and through the IIT Writing Center (see page 271), located in Siegel Hall 232-233, the CAC provides assistance in communication skills for academic inquiry, professional research, and the workplace. The CAC also assists IIT 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 director also administers IIT's Basic Writing Proficiency requirement.

Disability Resources

Web site: www.iit.edu/cdr

Services for persons with disabilities are coordinated by the Center for Disability Resources. Persons with disabilities who are interested in applying for admission to any of IIT's educational programs are invited to call the center or to email **disabilities@iit.edu** prior their arrival on campus to discuss their individual needs. Enrolled students with disabilities are encouraged to contact the director of the Center for Disability Resources to register and request accommodations.

Fraternity and Sorority Life

Web site: www.iit.edu/student_life/greek_life

The Greek community at IIT is focused on giving students the chance to learn both inside and outside of the classroom. IIT's seven fraternities and three 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.

Health Services

www.iit.edu/student_health

Student Health Services focuses on primary care with a strong emphasis on wellness and patient education. The staff includes a general physician, nurse practitioners, and a registered nurse. All members of the senior staff have advanced degrees and certifications or licenses to practice their specialties. Numerous programs are presented throughout the year to promote health and wellness.

The center can provide diagnosis and treatment of common illnesses and injuries and prescriptions for medication. Both women's and men's health care concerns are addressed, including gynecological exams and birth control. Additional services include allergy shots, immunizations, and laboratory testing. Complicated medical cases are referred to the physician who is available on campus for 2 hours, one day per week, or to specialists. The physician is also available for consultation by our staff on an ongoing basis. Student Health Services also administers the student health insurance plan.

For emergencies occurring after office hours, the Public Safety Department will transport students to a local hospital emergency room. Health services are confidential, and there is no charge for office visits. Charges may apply for laboratory tests, medications, and immunizations.

Housing & Residential Services

Web site: www.iit.edu/housing

More than half of IIT's full-time undergraduates live on campus. Housing & Residential Services offers a wide range of accommodations, programs, and services designed to enhance campus life. Housing & Residential Services maintains residence halls and apartments designed to meet the different needs of IIT students, faculty, and staff. Within these buildings, Housing & Residential Services staff members coordinate academic and social programming, assist students with personal and academic concerns, supervise Resident Advisors and Community Desk Assistants, and advise the Residence Hall Association. Please contact Housing & Residential Services for further information about these options.

International Center

www.iit.edu/∼internat

The purpose of the International Center is to promote international education and cultural exchange by (1) supporting international students, faculty, staff and students studying abroad, (2) assisting in the compliance of immigration and other related regulations, (3) providing services and resources to the IIT community. These services include: individual and group orientations to the university and community; assistance with document preparation for employment and other related non-immigrant benefits; workshops for faculty, staff, and students on issues affecting international student and scholars; cross-cultural activities and programs that promote intercultural perspectives and address adjustment issues; study abroad advising for students interested in studying in another country.

All international students, scholars and faculty are required to report to the International Center immediately upon arrival.

Leadership Academy

Web site: leadershipacademy.iit.edu

The Leadership Academy is an integral component of IIT's interprofessional approach to undergraduate education. Its objectives are to create and implement an effective leadership development curriculum for IIT 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 IIT full-time undergraduate student can attend and earn points toward a certificate in leadership studies.

Libraries

Web site: library.iit.edu

IIT's libraries include Paul V. Galvin Library; the Center for the Study of Ethics in the Professions (Main Campus); the Graham Resource Center (Main Campus); the Louis W. Biegler Library (Rice Campus); the Downtown Campus Library, serving the Chicago-Kent College of Law and the Stuart School of Business; the National Center for Food Safety & Technology Library (Moffett Campus); and the IIT Archives (Main Campus).

Paul V. Galvin Library

Web site: library.iit.edu

As the university's central library, Paul V. Galvin Library combines cutting-edge information technology with traditional library services. The library's holdings include more than 1.2 million volumes, including books, journals, government publications, and microforms. Digital services provide 24-hour Internet access to more than 120 electronic databases indexing millions of journal articles; over 25,000 full text electronic journals; electronic course reserves; and I-Share, a statewide resource sharing consortium of more than 75 academic libraries. Additionally Galvin Library provides web-based delivery of a variety of materials, including documents requested via interlibrary loan. The library's instruction program serves the IIT community by teaching skills needed to locate, retrieve, and evaluate information. Library instructors teach at all levels from introductory to advanced and cover a broad range of all types of information and retrieval techniques. Library workshops are offered regularly throughout a semester or can be specifically tailored for a course or program by library subject specialists.

Phone number: 312.567.3616

Graham Resource Center

Web site: library.iit.edu/grc

A branch of the Paul V. Galvin Library, the Graham Resource Center (GRC) serves as the subject-specific library for College of Architecture students and faculty. Housed in Crown Hall, the GRC collection includes more than 15,000 books, 50 journal titles, and a number of online resources to support curriculum goals and meet research and reference needs. GRC staff can assist Architecture faculty and students with reference, instruction, and course reserves

Phone number: 312.567.3256

Louis W. Biegler Library

Web site: library.iit.edu/biegler

The Louis W. Biegler Library, a branch located at the Rice Campus in Wheaton, provides access to a circulating collection, reserve materials, and journals, as well as access to digital resources. Services for distance learners are coordinated at Biegler, and include interlibrary loan, web-based document delivery, research and reference consultations, and library instruction.

Phone number: 630.682.6050

Center for the Study of Ethics in the Professions

Web site: ethics.iit.edu

The Center, located in Hermann Hall, contains a variety of materials dealing with topics in practical and professional ethics, such as autonomy, confidentiality, conflict of interest, and self regulation. The library provides bibliographic assistance to researchers and assists visiting scholars and practitioners.

Phone number: 312.567.6913

Downtown Campus Library

Web site: library.kentlaw.edu

Serving Chicago-Kent College of Law and IIT's graduate business program, the Downtown Campus Library (DTC) also includes an extensive collection of U.S. Government, United Nations and European Union documents. The DTC library provides access to digital resources, as well as services such as reference, instruction and interlibrary loan.

Phone number: 312.906.5600

National Center for Food Safety and Technology Library

Web site: library.iit.edu/ncfst

Located on IIT's Moffett Campus in Summit, the NCFST branch library supports research on food technology and food safety. 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 databases, as well as services such as interlibrary loan, web-based document delivery, and library instruction.

Phone number: 708.563.8163

Multicultural Student Services

Web site: www.iit.edu/omss

Serving as the primary office for students' personal and professional development, the Office of Multicultural Student Services is an ally for domestic students of color, women, LGBT, and other diverse populations. The office provides a variety of programs and services that address culture, history, policy, values, and belief systems. These programs promote and celebrate diversity and equality. All students, faculty, staff, alumni, and friends of the University are welcome to partner with the Office of Multicultural Student Services in advancing its efforts to support diversity.

Registrar

Web site: www.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 enforce academic policy, registration, grading, enrollment certification, course information, CTA U-Pass distribution, the production of diplomas and official transcripts, and other related university functions.

Spiritual Life

Web site: www.iit.edu/spiritual_life

The Office of Spiritual Life serves students of all faith traditions. Together with student religious organizations and other university offices, the Spiritual Life Office sponsors activities for faith development, worship, socializing and service. The office sponsors interfaith learning opportunities on campus, and provides information about religious resources both on and off campus. Home to IIT's Service Learning program, the office also offers regular community service activities. The Director of Spiritual Life is available to discuss personal or spiritual issues. Contact the Director at 312.567.3160 or spiritual.life@iit.edu. The Office of Spiritual Life is located in MTCC 213 fore more details, visit **www.iit.edu/spiritual_life**.

Student Affairs

www.iit.edu/student_affairs

The Office of the Dean of Students oversees many areas of student life and serves as the primary advocate and ombudsperson for students. The office also manages the student conduct process. Students, faculty and staff are encouraged to contact the office for help or referrals.

Activities outside the classroom and laboratory complement and enhance IIT's central educational mission. IIT 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 IIT Student Handbook.

Student Counseling Services

Web site: www.iit.edu/counseling_center

The Counseling Center, located on the 3rd floor of IIT Tower, provides clinical services and outreach programming to IIT students, and consultation to students, staff, faculty and parents of IIT students. To schedule a first meeting, please call 312.567.5900.

Clinical services include brief psychotherapy, referral and medication management. When a student's treatment needs are best served off campus, counseling services staff will work with the student to find referrals to local service providers. Students receive assistance with many issues, including 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 counseling process aim is to help students resolve personal difficulties and acquire the skills, attitudes, and knowledge to take full advantage of their college experience. Length of treatment may vary based on the clinical assessment of the student's treatment needs. The SCS typically offers up to 16 counseling sessions per student. Some presenting concerns are best served by a treatment approach that is not time limited, or require a specialized treatment approach. In those cases, the student typically receives referrals to off-campus providers.

There is no charge for an initial evaluation. Most services, including counseling sessions, are free to currently enrolled IIT students. If there is a charge, notification is upfront and in writing. Appointments with the psychiatrist and medications may be covered by the student health insurance plan.

Clinical Services are provided by licensed doctorate-level psychologists, a psychiatrist and closely supervised professionals in training. The confidentiality of these services is protected by professional ethics and state laws. Personal information is never released to anyone outside of Student Counseling Services without written permission. There are exceptions to this policy, such as when a therapist believes an individual is at risk of seriously harming him/herself or another person.

Student Counseling Services also provides outreach programs on campus, including workshops, screening days and presentations. Programs are provided on many topics, such as a stress management, alcohol and drug abuse prevention, and time management. For a schedule of upcoming workshops visit **www.iit.edu/counseling_center**.

Student Counseling Services staff frequently provides consultation to members of the university community including staff, faculty, students and parents who are concerned about a student's welfare.

Crisis Services

Crisis meetings are arranged during regular business hours. If urgent assistance is needed, call 312.567.5900, or walk in to Student Counseling Center on the main campus.

After hours, weekends and holidays there are several options for crisis and emergency situations. All of these options are available 24 hours per day, every day of the week including holidays. Services are available to *all IIT students*, including those who do not have Aetna health insurance.

Aetna Student Assistance Program crisis line	877.351.7889
National Suicide Prevention Lifeline	800.273.TALK
IIT Public Safety Department	312.808.6363
Chicago Rape Crisis Hotline	888.293.2080
Hazeldon Substance Abuse Recovery	800.257.7810
City of Chicago Emergency	911

Student Life

www.iit.edu/student_life

The Office of Student Life provides campus programs and events designed to enhance the student educational experience outside of the classroom. Student Life also manages the operation of student organizations, the campus Service Learning Program and Greek Life. The office provides direct oversight to over 100 student organizations, including Student Government Association, Union Board, and Greek Council. Other registered student organizations on campus represent a variety of student interests in areas such as culture, academics, arts, and recreation.

Technology Services

Web site: www.iit.edu/ots

The Office of Technology (OTS) supports IIT's primary technology services including administrative systems, myIIT, network and telephone infrastructure, and distance learning technology. OTS maintains over 540 computers in its classrooms, labs and public terminals throughout the Main, Adams Street, and Rice Campuses. The computers in the classrooms and labs are refreshed on a three-year cycle, to ensure that students have access to equipment that supports their academic activities. The classroom and lab instructional software is reviewed and updated every semester by the IIT Software Committee. OTS also supports remote printing from personal laptops/desktops to printing release stations located in various computer labs and public areas. Additional information about this service is available on the IIT Print channel and the OTS portal website, accessible through the myIIT Training and Support tab.

OTS manages the myIIT web portal **my.iit.edu**, which provides personalized access to email, online course registration, Blackboard, OTS Support, student life, and other content. Supplemental class materials are available through Blackboard, IIT's course management system, where instructors post lectures, notes and other course information. IIT Online courses and video lectures are also accessed through Blackboard.

The OTS Support Desk is the central point of contact for technology support at IIT. Support Desk staff provide technical troubleshooting, account management, and configuration assistance to students, faculty and staff. OTS Support is available through myIIT, including 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 Support tool in myIIT, sending a request via email (supportdesk@iit.edu) or by calling the Support Desk at 312.567.3375 (on-campus ext. 7-DESK).

IIT provides Internet access through its wired and wireless networks. Most Main Campus buildings have wired Internet access and wireless is available in all residence halls and academic buildings, as well as in most other Main Campus buildings. Visit the OTS website to view IIT's current WiFi coverage and to learn how to connect to the IIT network.

Visit the OTS website: **www.iit.edu/ots** and the internal site on the *Training and Support* tab in myIIT. for the most up-to-date information and useful details about IIT's technology.

Undergraduate Academic Affairs

Web site: www.iit.edu/ugaa

The Office of Undergraduate Academic Affairs provides a variety of academic support services for an undergraduate student 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; 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. DegreeWorks, the online degree audit system is monitored and maintained by the Office of Undergraduate Academic Affairs.

Undergraduate Research

Web site: www.iit.edu/research/undergraduate_research

Undergraduate students at IIT have the opportunity to work in faculty labs on government, foundation, and industry funded research projects in all departments. These research experiences offer students the opportunity to be involved in cutting edge research, applying their knowledge and skills outside the classroom. The Office of Undergraduate Research (OUR) works to enhance existing programs at IIT and provide new opportunities for mentored collaborative research experiences for undergraduates. The office promotes both intra- and extramural research opportunities for undergraduates, helps facilitate faculty-student interactions, and provides fellowship opportunities for students involved in undergraduate research. More information about undergraduate research can be found at **www.iit.edu/research/undergraduate_research** or by emailing the office at undergrad_research@iit.edu.

Writing Center

Web site: www.iit.edu/csl/hum/resources/writing_center.shtml

IIT students can seek assistance with written and oral assignments at the IIT Writing Center, located in Siegel Hall 232-233. 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 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.

Officers and Faculty

Administration

Office of the President

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B.S., M.S., Ph.D.
President

Alan W. Cramb
B.S., Ph.D.
Provost and Senior Vice President for Academic Affairs

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Associate Vice President, Communications

John Collins
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Vice President for Business and Operations

Elizabeth Hughes
B.A.
Vice President for Institutional Advancement

Leroy Kennedy
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Vice President for Community Affairs and Outreach Programs

Patricia Laughlin
M.A., Ph.D.
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A.B., M.S., Ph.D.
Senior Vice President and Director, IIT Research Institute

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Vice President and General Counsel and Secretary

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Assistant Professor of Aerospace Engineering, 2008

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Associate Professor of Applied Mathematics, 2002

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Studio Assistant Professor of Architecture and Director of Digital Curriculum, 2009

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Associate Professor of Chemical Engineering, 2000

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Professor of Law and Director of the Graduate Program in Financial Services Law, 1997

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Professor of Mechanical and Aerospace Engineering, 1999

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Professor of History and Chair of the Pre-Law Advisory Committee, 2000

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Professor of Architecture, John H. and Jeanne M. Rowe Chair, and Dean of the College of Architecture, 1996

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Professor of Psychology, 1982

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Professor of Philosophy and Co-Director of Graduate Studies, 1980

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Assistant Professor of Physics and Guest Scientist at Fermi National Accelerator Laboratory, 2006

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Lecturer of Financial Markets and Associate Director for M.S. in Finance, 2002

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Hyosung S.R. Cho Professor of Chemical and Biological Engineering and Director of the Center of Excellence in Polymer Science and Engineering, 1989

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Professor of Computer Science, 1997

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Associate Professor of Chemistry and Associate Chair, 2000

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Professor of Law and Faculty Director of the Center for Law and Computers, 1990

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Motorola Distinguished Professor of Chemical Engineering and Vice President for International Affairs, 1964

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Associate Professor of Architecture, 1989

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Professor of Physics, 1998

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Steelcase/Robert C. Pew Professor of Design and Dean of the IIT Institute of Design, 1983

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Studio Associate Professor of Architecture, 2006

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Distinguished Professor of Law, 1985

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Assistant Professor of Mechanical Engineering, 2007

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Professor of Mechanical Engineering and Chair, Department of Mechanical, Materials, and Aerospace Engineering, 2002

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Professor of Psychology, 1996

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Professor of Physics and Associate Dean of Research, College of Science and Letters, 1982

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Associate Professor of Mathematics and Science Education, 2002

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Assistant Professor of Biology, 2004

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Professor of Electrical Engineering, 1966-1982

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Professor of Law, 1991-2003

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Associate Professor of Microbiology, 1957-1991

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Professor of Metallurgical and Materials Engineering, 1964-1991

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Professor of Physics, 1965-2001

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Professor of Applied Mathematics, 1994-1998

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Joseph S. Chung
Professor of Economics, 1964-1995

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Professor of Law and President Emeritus, 1970-2009

William F. Darsow
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Perlstein Distinguished Professor of Engineering, 1958-2004

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Professor of Materials Engineering, 1969-1998

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Professor of Psychology, 1969-2009

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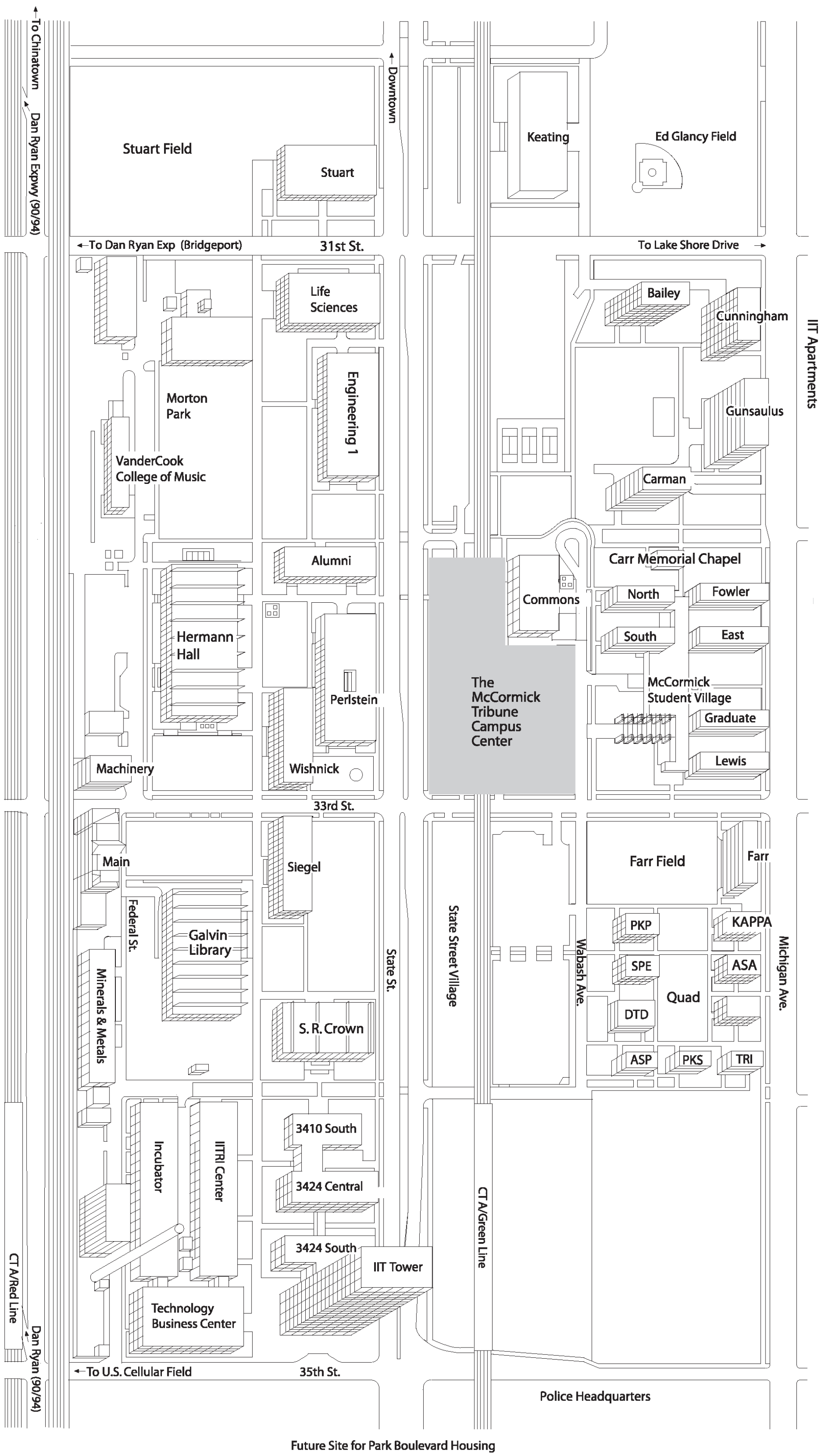
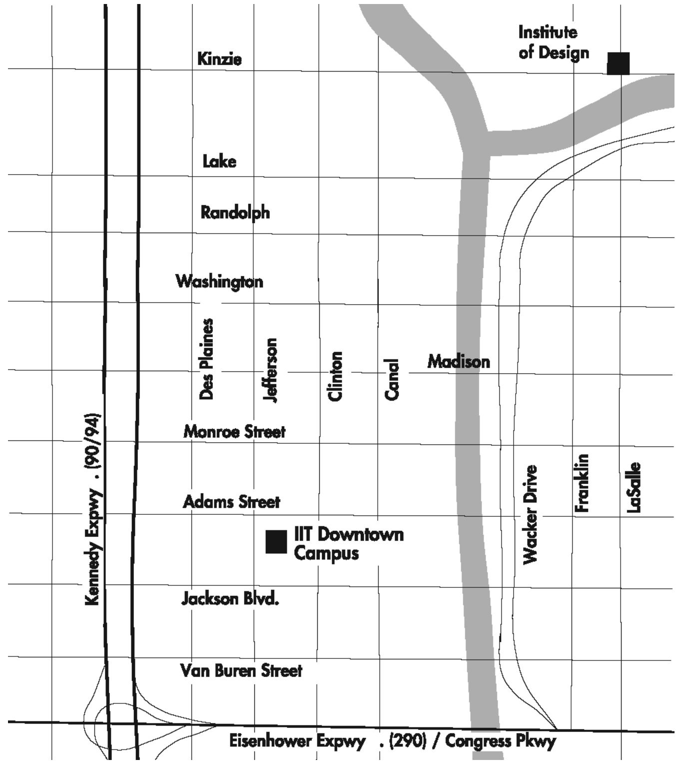
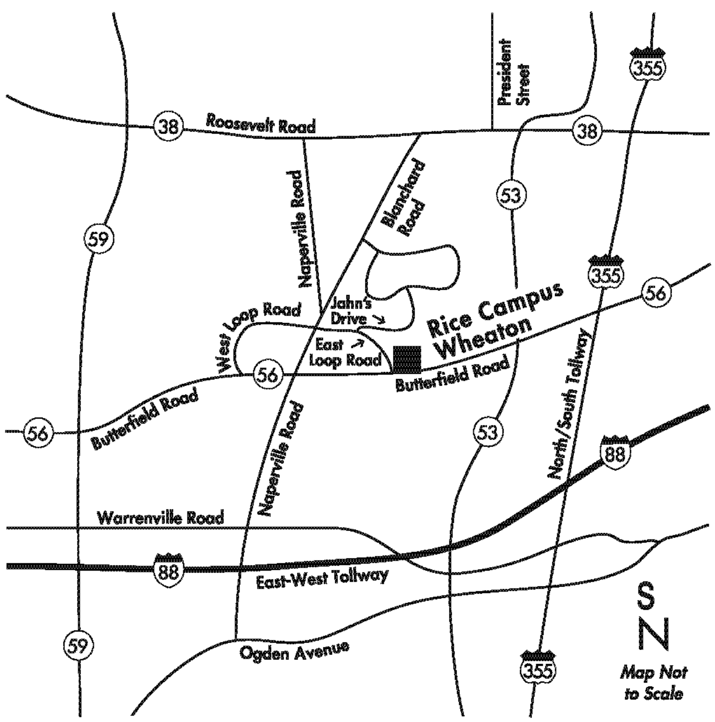
Main Campus


To Chinatown
Dan Ryan Expwy (90/94)
Downtown
Stuart Field
Stuart
Keating
Ed Glancy Field
To Dan Ryan Exp (Bridgeport)
31st St.
To Lake Shore Drive
Life Sciences
Bailey
Cunningham
IIT Apartments
Engineering 1
Morton Park
Gunsaulus
VanderCook College of Music
Carman
Carr Memorial Chapel
Alumni
Commons
North
Fowler
Hermann Hall
South
East
Perlstein
The McCormick Tribune Campus Center
McCormick Student Village
Graduate
Machinery
Wishnick
Lewis
33rd St.
Main
Siegel
Farr Field
Farr
Federal St.
Galvin Library
State St.
State Street Village
PKP
KAPPA
Wabash Ave.
Michigan Ave.
Minerals & Metals
SPE
ASA
Quad
S. R. Crown
DTD
ASP
PKS
TRI
3410 South
Incubator
IITRI Center
3424 Central
CTA/Green Line
3424 South
IIT Tower
CT A/Red Line
Technology Business Center
Dan Ryan (90/94)
To U.S. Cellular Field
35th St.
Police Headquarters
Future Site for Park Boulevard Housing

Downtown Campus and Institute of Design



Rice Campus



Getting to the Main Campus

Airports

IIT and Chicago are served by O'Hare International Airport and Midway Airport. Public and private transportation is available from the airports to downtown Chicago and IIT campuses.

Train

Commuter railroads to Union and Northwestern train stations (both off Canal Street), then public transportation, taxi or IIT shuttle bus from the Downtown Campus at 565 W. Adams Street to Main Campus.

Bus

To Greyhound terminal, then taxi or public transportation to IIT.

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) to just past State Street. Visitor parking is on the right (south-east corner).

From South: Dan Ryan Expressway west to 35th Street exit, continue north to 33rd Street, turn right (east) to just past State Street. Visitor parking is on the right (southeast corner).

From Lake Shore Drive: Exit at 31st Street, go inland (west) to State Street, turn left (south) to 33rd Street, turn left and visitor parking is on the right (southeast corner).

Parking

Some visitor parking is available in lots at the southeast corner of 33rd and State streets and the northeast corner of 31st and State streets. By special arrangement, events parking is usually available in the fraternity lot at 33rd and Wabash and, for evening events, in the lot west of Hermann Union Building. A few hourly spaces are available just south of the Commons Building and west of Hermann Union Building. Please call the Public Safety Department at 312.808.6300 if you need assistance in finding parking.

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