

ILLINOIS INSTITUTE OF TECHNOLOGY
GRADUATE ACADEMIC AFFAIRS
THESIS MANUAL



Illinois Institute of Technology Thesis Manual

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2005

Revised 9/9/2020

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Acknowledgement

This Thesis Manual is the result of the contributions of many IIT faculty and students. The original Thesis Manual was written in 1953 and revised several times over the last fifty years. I am pleased to present to you this thesis manual for your reference and use.

This 2016 edition of the manual has been completely revised and provides you with information on the new requirements for thesis preparation, formatting and styles. The manual has been carefully prepared and edited for accuracy and compliance with the Graduate College's latest regulations and requirements for the preparation of a thesis. The Graduate College welcomes your comments and suggestions for improving this document.

I would like to sincerely acknowledge the work of Patty Johnson Winston, PhD, Director of Academic Writing and Thesis Examiner, for preparing and editing this document and making it available on the web for your use.

Jamshid Mohammadi, PhD
Associate Dean for Academic Affairs
Graduate College
Illinois Institute of Technology

Preface

In this document, we will use the word “thesis” as pertaining to both master's and doctoral works. A thesis¹ must satisfy two sets of criteria: (1) academic and intellectual requirements assessed by the faculty of the university; (2) a document which embodies intellectual requirements and the original point of view that is proposed. This Thesis Manual is mostly concerned with the second aspect of a thesis.

Suggestions to Students: All students must carefully read the content of this Thesis Manual before writing their theses. If a student's style of manuscript does not conform to the standards of this Thesis Manual, the prior approval of the Thesis Examiner must be sought. It is imperative to be consistent in format and style throughout the thesis. A sample thesis is available at:

<https://web.iit.edu/gaa/thesis>

Every student must consult the Sequence of Events and deadlines for graduate students that are published each semester by the Graduate Academic Affairs, located 10 West 35th Street, Suite 7D7-1.

<https://web.iit.edu/gaa/students/dates-and-deadlines>

If the indicated deadlines are not met, the student's graduation may be delayed until the following semester. The appointments with the Thesis Examiner are set up to help students avoid unforeseen problems in

preparing a thesis and to provide suggestions otherwise unavailable to students.

Throughout this Thesis Manual a preliminary draft of a thesis refers to the one prepared for discussion with the Thesis Examiner, which must include samples of starred items on page 2, as well as samples of tables, figures and photos. The Thesis Examiner will reject no preliminary draft, when the student has made an effort to use the IIT approved format; however, the extent of corrections required for an acceptable final draft will vary with the stage of development of the preliminary draft.

Suggestions to Faculty Advisers: In order to advise students better, every faculty adviser should be familiar with the contents of this Thesis Manual. In case there are any questions, faculty advisers may contact the Thesis Examiner through the Graduate College. In the absence of specific recommendations from the adviser, the Thesis Examiner (in consultation with the Dean of the Graduate College) shall have the final responsibility to interpret the totality of the rules in accepting or rejecting an individual thesis as suitable for binding and depositing in the IIT library.

¹ “thesis (the'sis)n., pl. -ses (-sez'): 1. A proposition that is maintained by argument. 2. A dissertation advancing an original point of view as a result of research, especially as a requirement for an academic degree ``dissertation (dis'ar-ta'shan) n.: A lengthy, formal treatise, especially one written by a candidate for the doctoral degree at a university; a thesis.” (Source: American Heritage® Dictionary of the English Language: Fourth Edition. 2000.)

General Information

The bound thesis will be retained at the IIT library, and a digital copy will be stored in the IIT Digital Repository; therefore, it is imperative to present the thesis in an acceptable form according to the rules and standards established in this Thesis Manual. These standards reflect those of the University Microfilms and Dissertation Abstracts for Ph.D. dissertations; the standards apply to Master's theses as well.

Contents of a Thesis

Every thesis, typed double spaced, must consist of three major divisions:

1. Preliminaries
2. Text
3. Supplementary information

These divisions may in turn be composed of sub-divisions. Each item will be discussed in the following chapters. The divisions must be prepared in the following order (starred items are requested in all cases):

Preliminaries

- Title page*
- Blank page (or copyright notice page)*
- Acknowledgments (optional but usually included)
- Table of Contents*
- List of Tables (if thesis contains tables)
- List of Figures (if thesis contains figures)

- List of Abbreviations (if thesis contains symbols and abbreviations)
- Abstract (mandatory)*

Text

- Introduction*
- Historical Review or Survey of the Literature*
- Body of the Report*
- Methods and Procedures
- Results
- Conclusions
- Summary (and recommendations for further studies)*

Supplementary Information

- Appendix (if thesis requires appendix)
- Vitae (optional)
- Bibliography*

Spelling

Many words in English may be spelled correctly in more than one way. A student must be consistent in such usage, and ordinarily the spelling given first in a recent edition of a standard dictionary is preferred. Simplified spellings should be avoided, such as “thru” for “through” and “nite” for “night.”

Thesis Copies

The Thesis Examiner approves the final copy of the thesis and provides instructions

about the final deposit and forms requirements. The final copy of the thesis is converted to PDF and is uploaded to the ProQuest ETD Administrator. After the uploaded copy has been reviewed and approved, and Graduate Academic Affairs has officially awarded graduates' degrees, the approved PDF copies are digitally sent to ProQuest, where the three bound copies are produced. The bound copies are shipped to IIT for distribution to Galvin Library and the appropriate colleges/departments. The thesis fee includes the cost of binding three copies for IIT. However, additional copies for personal use may be ordered through the ProQuest ETD Administrator or taken to Office Services for binding.

Manuscript Preparation

Students should prepare the manuscript using a computer. A description of the allowable structure, spacing and fonts is provided in the following sections.

A set of instructions and a "style" file for using the LaTeX word processing system may be obtained, by contacting the Thesis Examiner. By following the style file, students can format their thesis to conform to the IIT thesis style. The style file and LaTeX are a collection of "macros" written for the powerful mathematical typesetting program TeX.

Students may use other word processing programs, such as Microsoft Word, Corel Word Perfect, etc. A template for the IIT thesis in Microsoft Word format is available at:

<https://web.iit.edu/gaa/thesis>

Fonts

The final manuscript of a thesis should be prepared in a standard type face with black letters using either 10 point or 12 point. The fonts recommended are: 12 point Times New Roman, 12 point Courier, 10 point Geneva, 12 point Palatino or 12 point New

Century Collegebook. Special sizes or styles of non-standard typefaces must be recommended in writing by the student's adviser and approved in advance by the Thesis Examiner.

Characters that slant to the right are, typically, italic fonts. Bold characters are presented darker and thicker than normal fonts. Most word-processing programs and printers allow the use of italics and bold type. However, italics and bold fonts used in text are not distinctive enough and not always easily recognizable in electronically prepared manuscripts. Therefore, bold type is allowed for first-, second-, and third-order headings. Italic type is allowed in headings but is not encouraged within the text of the thesis, unless it is used for a scientific or medical term that is always written in italic.

To avoid uncertainty and ambiguity, underlining should be used rather than italics for emphasis in non-typeset manuscripts. Use italics or underlining to emphasize words and letters, but do so sparingly and out of necessity. Underline or italicize foreign words on first reference only. Underline special terminology, for example scientific terms, such as genus or species, or other technical terms requiring emphasis. The use of bold type, italics, or underlining words or phrases in the text simply for emphasis is rarely appropriate in research writing and strongly discouraged.

Lists

There are several types of lists, both ordered and unordered. For ordered lists, Arabic numbers (i.e., 1., 2., 3., etc.) are aligned on the periods following them. Ordered lists may be set flush with the text or indented. Additional lines for list items must be aligned with the first word following the numeral. In case additional paragraphs are subordinate to the numbered or ordered list item, the relevant text should also be indented appropriately and aligned with the first word following the numeral.

Unordered lists are sometimes referred to as bulleted lists. In this case, a standard bullet symbol [•] instead of a number precedes each list item. Unordered lists may be set flush with the text or indented. Additional lines for list items must be aligned with the first word following the symbol character. In case additional paragraphs are subordinate to the unordered list item, the text should also be indented appropriately and aligned with the first word following the symbol.

For punctuation of listed items, refer to your department's preferred style manual. In general, though, the first word in each listed item is capitalized and includes the appropriate end punctuation, if each list item is a complete sentence. If the items are syntactically part of the previous sentence, however, then the first word is not capitalized and appropriate end punctuation is applied to only the last item in the list. Under no circumstances is mixing of complete sentences and sentence fragments allowed in the same list.

Style Manuals

Each graduate student should check with their respective department regarding the appropriate style manual for their thesis. Use one of the following:

American Institute of Physics. *Style Manual for Guidance in the Preparation of Papers for Journals* (4th ed.). New York: American Institute of Physics.

IEEE Editorial Style Manual
http://www.ieee.org/conferences_events/conferences/publishing/style_references_manual.pdf

Gibaldi, Joseph. *MLA Handbook for Writers of Research Papers*. 6th ed. New York: Modern Language Association of America, 2003.

The Chicago Manual of Style. 15th ed. Chicago: University of Chicago Press, 2003.

Publication Manual of the American Psychological Association. (7th edition) Washington, D.C.: American Psychological Association (APA), 2019.

Pagination

Every page of a thesis has a number, whether the number is printed on the page or not. Pages in the preliminaries, preceding Chapter 1, are numbered consecutively in lower case Roman numerals centered 0.5 inches above the bottom of each page.

The title page is considered page i, but the number is not printed. If the thesis is to be copyrighted, then the second page contains the copyright notice, and the page is numbered ii. However, if the thesis is not to be copyrighted, then the second page is a blank page, and the number is not printed. All other subsequent page numbers are printed, and no other page is a blank. There must be no dashes, parentheses, or other characters around any page number. Page iii will usually be the Acknowledgments, and page iv will typically be the Table of Contents.

Beginning with the first page of Chapter 1 and continuing through the entire thesis (including the Appendix), pages must be numbered consecutively in Arabic numerals located 0.5 inch below the 8.5-inch top edge, and 1 inch in from the 11-inch right edge on every page. On tables or figures turned with the top at the bound edge—in Landscape—the page number should still be in the same place and direction as the normal vertical text page, i.e., all page numbers will be in the same direction over each other as the upper right corner is fanned. No line of text, table, figure or photograph may extend farther right than the last numeral of the page number. The first page of Chapter 1 must always be page 1. Insertion of late pages (such as 37, 37A, 38) is never permitted in a thesis.

Margins

The margins on all pages, whether text, table, figure, photograph or bibliography, must not be less than 1.5 inches from the bound edge and 1 inch from the other three edges except for page numbers. Margins are essential not only for uniformity of appearance, but also because the outer edges of the paper are trimmed off in the binding process. The left margin is wider to provide the spine for binding and still leave the text material visible when the book is opened. All pages except the last page of a chapter should be reasonably uniform, and no letter in any line should be farther right than an imaginary vertical line passing down from the farthest right numeral in the page number. Right margin justification is optional. Do not use right margin justification, if the printer spaces are noticeably wide or unevenly between words.

Consistency

The most important element of style in any writing is consistency. Alternate methods of punctuation, hyphenation, abbreviation, and capitalization may be acceptable in various fields. Once adopted, a system must be used consistently throughout the entire thesis. Use clear copies with sharp, black letters. Subscript, superscripts, and special symbols must be large enough to be meaningful (minimum 7 points). What every pattern used for section headings, sub-headings, and subsequent divisions, beginning in Chapter 1, must be continued throughout the document, where appropriate.

Prior Publications

Depositing of a thesis in the IIT Library constitutes archival publication, which represents an original and previously unpublished work. It is certainly to the student's advantage to publish some of the thesis material in an outside source before the thesis itself is submitted for the degree. The Associate Dean of the Graduate Academic Affairs will entertain a petition

from the student, endorsed by the research adviser, stating the part of the thesis to be published, the name of the publication, and the author's names. This procedure is necessary to protect the student if at some later date the credibility is challenged. A reprint of an article (assuming that the permission is granted by the publisher of the article) may appear in the Appendix. If any part of the article is to appear in the text, a related Bibliography entry and a citation must be provided in the text.

Special Requirements for Ph.D. and Master Degree Candidates

IIT participates in the services offered by UMI Dissertation Publishing in Ann Arbor, Michigan, to doctoral students and master's degree students: (1) your thesis is "published" once it is uploaded to the ETD Administrator and sent to Proquest; and (2) an abstract is printed in Dissertation Abstracts announcing to the public that your thesis is available from UMI.

On the ETD Administrator site, the student must sign a Dissertation Publishing Agreement Form authorizing ProQuest Information and Learning (PQIL) to deposit and publish the thesis, while holding them harmless from any damages which might arise from copyright violations. The original copy of both the thesis and the agreement are sent to UMI Dissertation Publishing. When the original copy of the thesis is returned to IIT, it is bound and becomes the archival library copy.

For publishing in Dissertation Abstracts International, the student must post a copy to the ETD Administrator and deposit one copy, in the UMI format. This copy is kept in the student's file in Graduate Academic Affairs. The abstract is separate from the thesis and is expected to give a succinct account of the dissertation so that a reader can decide whether to read the complete dissertation.

The heading of the UMI Dissertation Abstract must include the following: (1) Title (all capitals), (2) author's name and title, (3) school (Illinois Institute of Technology) and date of graduation, (4) adviser's name. Although 350 words should be the maximum length, a slightly longer abstract may be accepted. An abstract of this sort contains: (1) statement of the problem, (2) procedure or methods, (3) results, and (4) conclusions. The abstract will be published without editing or revision. The copy must be printed on one side of the paper only and must be double-spaced. An abstract never contains footnotes.

Preliminary Pages

The preliminary pages are double-spaced with lower case Roman numeral page numbers. Omit the page number on page i, which is the title page. Throughout, the thesis, paragraphs must be indented 0.5 inches from the left margin. The number of spaces used for indentation must be uniform throughout the thesis. Examples of the preliminary pages are given in the sample PDF thesis available at:

<https://web.iit.edu/gaa/thesis>

Title Page

Your title will determine how widely the subject matter of the thesis will be disseminated. Academic research is to be shared, and the thesis is a major way of doing this. The Dissertation Abstracts uses an automated keyword retrieval system to index at least 34,000 dissertation titles a year. To make retrieval easier and more accurate, they suggest the following: (A) use words in the title that describe the dissertation content; (B) eliminate words that add little or nothing to an understanding of content, words like: “A Study of...” “The Origin and Development of...”

A good title will be less than 10 words in length, and a reasonable title should be less than fifteen words in length. Subtitles are to be avoided if possible. The title must be centered about 1.5 to 2 inches below the top edge of the paper. The single word “BY” must be typed in capital letters and centered about 2 inches below the title. The author's full name in capital letters must be centered and a double-space below the word “BY.” A submission statement must be typed, each line centered, beginning about 6.5 inches below the top edge of the paper:

Submitted in partial fulfillment of the requirements for the degree of
(official name of degree as shown in
Graduate Bulletin)
in the Graduate College of the
Illinois Institute of Technology

Submitted in partial fulfillment of the requirements for the degree of
(official name of degree as shown in
Graduate Bulletin)
in the Graduate College of the
Illinois Institute of Technology

At about 8.5 inches below the top edge of the paper and beginning at the center of the page should appear the word “Approved,” followed by an underscored line that extends to 1 inch from the right edge of the paper. On the next single line must appear the word “Adviser” centered below the underscored line. If there is a co-adviser, then a similar underscored line, double-spaced below the word adviser and the same length as the first underscored line, must be added with the word “Co-adviser” single-spaced and centered below the second underscored line.

In the center of the page at the bottom must appear “Chicago, Illinois.” The month and year of conferring of the degree (e.g., “May 2016”) must be centered and one single-space below, leaving a 1-inch margin at the bottom edge of the page. Per university policy, the acceptable months are December (fall semester), May (spring semester), and July (summer semester).

The original copy must bear an original signature of the adviser (and co-adviser) on the title page when it is submitted to the Thesis Examiner for final approval.

Copyright Page

A Master Degree candidate is not allowed to copyright a thesis; however, for a PhD

candidate it is optional. If the thesis is to be copyrighted, a copyright page (page ii) must be inserted immediately after the title page. (In an un-copyrighted thesis, page ii is blank and has no page number.) The copyright bears the following double-spaced citation in the center of the page:

© Copyright by
Full legal name of the author
(Year of publication)

The inclusion of © is a mandatory legal requirement. The page number, ii, is centered, 0.5 inches above the bottom of the page. If the thesis is not to be copyrighted, then this is a completely blank page with no number typed.

A doctoral student may arrange for PQIL to act as the agent to secure the copyright in the student's name by electronically signing the agreement form, during the ETD Administrator process, in the appropriate place and by paying the designated fee, which is listed on the website. This includes the copyright registration fee plus the cost of two copies required by the Copyright Office. A student who wishes to copyright a Ph.D. thesis after graduation must make arrangements independent of IIT.

Acknowledgment

An acknowledgment is not a mandatory part of a thesis, but it gives the student an opportunity to express appreciation for the receipt of financial support or for contributions of others to the work. It should be simple and sincere; one should not overdo one's expression of gratitude in a thesis. The word "ACKNOWLEDGMENT" must be centered, in capital letters, at the top of the page. The acknowledgment is indented 0.5 inches, as a paragraph, and a triple-space below the heading—the first line of text begins on the third single line. The acknowledgment must not exceed one page in length and may be single spaced. (Double-spaced is allowed if not exceeding

one page.) The page number iii is centered 0.5 inches from the bottom of the page.

A thesis does not include a dedication, and material in the nature of a preface should be included at the beginning of Chapter 1 of the text, not in the acknowledgment.

Table of Contents

The words TABLE OF CONTENTS must appear in capital letters centered on the top line of the page. Triple-spaced below the heading at the right margin (1-inch from the edge of the paper), the word "Page" must appear. On the next line, the first heading of the Preliminary section appears at the left margin (1.5 inches from the edge the of paper), all in capitals and then followed by a series of periods extending to two spaces before the space immediately below the P in the word "Page." Periods in subsequent lines should be aligned with those in this first line. The last digit of the column of page numbers should fall under the "e" in the word "Page." The word "CHAPTER" follows the list of preliminary pages, double-spaced and at the left margin. On the next single spaced line the Arabic numeral 1 and a period "1." must appear under the letters "E" and "R," respectively, in "CHAPTER." The Chapter titles follow in the third space after the period, capitalized, just as they appear on the pages indicated. CHAPTER 1 must always be page 1.

Major sections are separated by double spaces above and below them. Sub-headings are indented two additional spaces and are single spaced. If the chapter title is more than one line long, it should be continued on the next line, flush with the initial line of the title. Every chapter title and first order sub-heading title must appear in the Table of Contents, exactly as shown on the page indicated. If a sub-heading is more than one line long, then the carry over should be indented two additional spaces. Second or third order sub-headings normally are not included in the Table of Contents.

If the Table of Contents is continued on a second page, then the page break must be between chapters, and the heading is not repeated. The words "CHAPTER" and "Page" may appear at the top of the second page, but the rest of the page should be spaced like the first page.

List of Tables

If tables are used in the thesis, the words "LIST OF TABLES" must appear in capital letters on the first page of the list of tables, centered at the top of the typed page. On the first page and on succeeding pages of the List of Tables, the heading and page numbers should be set up in the same way as those in the Table of Contents; the last digit of the column of page numbers should fall under the "e" in the word "Page." The decimal point in the table number should align with "e" in "Table," and the title of the table follows after two spaces. The title in the List of Tables must appear exactly as the title of the table on the page indicated. Only the first letters of principal words are capitalized. Titles are double-spaced; carry-overs are single-spaced and aligned, having the first letter of the word on the second line directly under the first letter of the word on the first line. In the case of a long table, only the page number on which the table began must be given. A Table may not have subdivided numbers or letters (e.g., Table 4.1A and Table 4.1B). Each Table is designated a number. Tables appearing in the Appendix should be included in the List of Tables.

List of Figures

If illustrations in any form are used in a thesis, such as drawings, graphs, maps, charts, photographs, or structural formulae, they should all be identified as figures. The words "LIST OF FIGURES" must appear in capital letters on the first page of the List of Figures, centered at the top of the typed page. The format is the same as for the List of Tables. The decimal point in the Figure number should align with the "e" in "Figure." Figures appearing in the Appendix should be included in the List of Figures.

List of Abbreviations and Symbols

A separate list of abbreviations, symbols and nomenclature (if available) must be given in the preliminary pages. The words "LIST OF ABBREVIATIONS" (or "SYMBOLS AND NOMENCLATURE") must appear in capital letters on the first page of the list, centered at the top of the page. The word "Abbreviation" (or "Symbol") must appear triple-spaced below the title, beginning at the left margin, and the word "Term" (or Definition) should be centered on the same line. Double-spaced below appear abbreviations and the respective terms aligned down the page. A definition that is more than one line long is carried over to the next single-spaced line. If the list of abbreviations exceeds one page in length, then the subsequent pages omit the title but show the same headings for "Abbreviation" and "Term." Commonly accepted abbreviations, such as cm, and BTU should not be included in the list of abbreviations. If a separate list of abbreviations is not used, then in the text all words should be spelled out the first time the term is used, followed by the abbreviation in parentheses. Subsequently, only the abbreviation without parentheses is used, except in the Summary and in the Abstract where the word should be spelled out the first time followed by the abbreviation in parentheses.

Abstract

An abstract must be included in the preliminary pages. (This abstract is formatted differently than the separate UMI Abstract). The word "ABSTRACT" must be centered on the top line of the typed page. The abstract text begins on the third line, with a paragraph indentation of 0.5 inches. Abbreviations in the abstract should be spelled out the first time used, followed by the abbreviation in parentheses. Subsequently, only the abbreviation without parentheses is used. Footnotes are never used in an abstract.

Text Chapters

It may be helpful to review the section for margins, pagination, and sub-headings. All text chapters are to be double-spaced. Additional information for writing text chapters is given as follows.

Symbols, Equations, and Formulae

All material must be prepared on computer. No hand-drawn or hand-written material will be accepted in the final version of the thesis. It is easiest to begin equations with a uniform small left-hand indentation rather than to attempt to center each one. If a number identifies the formula or equation, that number should be typed on the right hand side of the page, maintaining the standard 1-inch right margin.

Hyphenation

Words divided at the end of the line with a hyphen should be divided between syllables as shown in a dictionary. Such divisions should be avoided if the first syllable is short. In addition, names, numbers, dates, and words in headings should not be divided. Use of hyphens or dashes should be minimized and used only where needed, never as ornamentation.

Punctuation

Excessive punctuation can be obstructive and superfluous. A period should always be followed by one blank space. An introductory subordinate clause should be followed by a comma. Commonly accepted abbreviations such as cm, gm, sec, should not be followed by periods. Short quotations in the text should be enclosed in quotation marks with the final period, question mark, or comma preceding the final quotation mark. Foreign words and titles of books and publications are usually set in italics in the text. Bold fonts for emphasis may be used, however, overuse may destroy its value in a

thesis. Therefore, the Thesis Examiner has the authority its request removal. Ditto marks should never be used in a thesis.

Numbers

In the text, numbers less than 10 should be spelled out. Any number at the beginning of a sentence must be spelled out. Dates, page numbers, section or chapter numbers, figure numbers, table numbers, street and telephone numbers, exact pages, sums of money, compound fractions, decimals, percentages, and units of measure should be given in figures. A decimal number less than one must begin with a zero.

Division Headings and Sub-Headings

The major sub-division of the text is called a CHAPTER, in capital letters, followed by an Arabic numeral. The word CHAPTER is not bolded, italicized or underlined. Each chapter must begin on a new page. The chapter and the chapter number must be centered on the top line of the page. The title of the chapter must be in capital letters, centered, and a double-space below the chapter designation.

Chapter titles should be followed by a triple space before the text paragraph or first order sub-heading (text begins on the third single line. If the chapter title is longer than one line, then the subsequent lines should be single-spaced and arranged in an inverted pyramid style with the lines separated at logical places.

First Order Sub-Headings

The principal sub-headings must start with the left hand margin, typed with initial capitals, and underlined or bolded. Subsequent text should start a double space below. (If a sub-heading number is not used, indentation of the heading is needed.

However, the paragraphs of the following text must be indented.)

Second Order Sub-Headings

The heading is typed in bold font with initial capitals, terminated with a period, and followed by the text on the same line. (If a sub-heading number is not used, no indentation of the heading is needed. However, the paragraphs of the following text must be indented.) Italic font or underline font may also be used, but not in combination; e.g., do not underline and bold a sub-heading or italicize and underline a sub-heading.

Third Order Sub-Headings

Third order sub-headings should be avoided. If used, however, they may be in bold font, italic font, or underline font, with initial capitals, terminated with a period and followed by the text on the same line.

Additional Sub-Heading Levels

In the event additional levels of sub-headings are necessary, then the first order sub-heading titles should be changed to bold font, centered headings, typed with initial capitals. The text must follow three spaces below the centered heading. The subsequent sub-headings must each be moved up one step in the above.

In the event centered first order sub-headings are used, they should be placed two double spaces below the text that precedes them, and followed by a triple space for the first line of the text that follows. Second and third order sub-headings have the normal double space below the preceding text.

Quotations

It is not advisable to use many or long quotations. A long quotation, arbitrarily defined here as consisting of four or more lines, must be set off from the rest of the text

by being single spaced and indented in its entirety 0.5 inches from the left margin and separated from the text both above and below it by a triple space.

There are no quotation marks allowed at the beginning or end, and the work quoted must be faithfully reflected, including original errors in the quote. Short quotations are enclosed in quotation marks and incorporated in the text itself. Every quote must be accompanied by a reference to the source in a footnote or in the Bibliography.

Printed material that is copyrighted must not be quoted without permission of the one who holds the copyright. Permissions must be recorded in the Acknowledgment or Appendix.

Footnotes

A footnote may serve one of several purposes. It may be a form of bibliographic reference to other authorities. It may be a quote or brief textual item which comments on the thesis author's statements. Or it may refer to material found elsewhere in the thesis. Any footnote should be brief. Long discussions should be incorporated directly in the text. In many fields, footnotes are restricted to literature references, but are rarely used. Footnotes do not replace the Bibliography, and should be mainly used to add additional ancillary or explanatory information about the designated text.

Position

The last line of the last footnote on each page must be on the last line that is the standard 1 inch from the bottom edge of the page. Double-space between footnotes, and single-space within a single footnote. Footnotes are separated from the text by a horizontal line, 1.5 inches long, beginning at the left margin and single-spaced below the last line of text or double-spaced above the top line of the footnote, if the page is not full of text. The footnote should be indented the standard 0.5 inches from the left margin. If

many individual footnotes are long, or if single superscripts contain several references to the same topic, then separate references in the footnote should be treated as paragraphs, indented 0.5 inches, and single-spaced from margin to margin. This system must be consistently applied throughout the thesis.

Footnote Citation in the Text

This should always be superscript, Arabic numerals, one-half space above the line of text. (Do not confuse footnotes with literature citations in the Bibliography). In most theses, numbers should begin with 1 and proceed consecutively through the entire thesis. Footnotes never use the 1.1, 1.2, 1.3, etc., system. If only a very few footnotes are scattered throughout the text, then asterisks

or other standard symbols may be used. Each citation in a footnote must appear on the page containing the citation number in the text.

References

Bibliographic references in footnotes should follow the form and style used in the Bibliography. (Refer to the Bibliography section of the Thesis Manual). When footnotes are extensive, subsequent footnotes referring to previously cited footnotes can be simplified by using abbreviations. The Latin words are in italics, followed by a comma, and then the page on which the reference is found. If the word is an abbreviation, it is immediately followed by a period before the comma. *Ibid.* means *ibidem*.

Tables

To some extent, the height and width of the table will govern where and how it is presented. A small table, of less than two-thirds of the vertical page length, should be inserted in the text between paragraphs (or at the top of next page) as soon as possible after it is mentioned. Tables up to a full page, either vertical or horizontal, should be inserted on the next numbered page, following the page on which they are first cited in the text. Usually tables longer than one page, those containing raw data or those not cited in the text, are placed in the Appendix. Tables may also be removed from the text and placed on consecutive pages, as one of the last chapters before the Appendix and so identified in the Table of Contents. Tables should not be enclosed in boxes. Tables must be typed and must be on the same kind of paper as the text. In the text, a table should always be referred to by number, for example: "...is shown in Table 26," not "...in the next table."

If using the APA Table format, refer to the *Publication Manual of the American Psychological Association*. (7th ed), Washington, D.C.: American Psychological Association (APA), 2019.

Numbering and Titles

All tables should be numbered with Arabic numerals, consecutively, throughout the entire thesis. Students are also allowed to use decimal points for numbering tables (i.e., Table 5.12, which refers to the 12th table in Chapter 5). If decimal points and chapter numbers are used, this number must be the same as the actual chapter in which the table appears. If tables are removed from the text and placed on consecutive pages in a separate chapter, all tables must be numbered with consecutive Arabic numerals.

Each table title must be placed at the top of the table, beginning with the word "Table," followed by the number, and followed by a period and the title of the table. The title of the table must be identical with the title shown in the List of Tables--in the preliminary pages. Only the first letters of principal words are capitalized. If the full table title is shorter than the width of the page, then it should be centered. If the title is longer than one line, then the word "Table" should be flush with the left margin of the page and the carry-over lines should be single-spaced and indented to begin under the letter "b" in "Table." No title may extend beyond either the left or right margin of the table or beyond the margins for written text (1.5 inches at the bound edge and 1 inch for the other three sides).

A double space should be below the last line of the title, followed by a double line border above the heading. A single line separates the headings from the body of the table, and a single line measuring the full width of the table separates the bottom of the table from the legend or footnotes below. If the table is small and on the same page with text, then it must be separated from the text by two double spaces (both above and below it).

Headings and Columns

All headings must be typed either horizontally or vertically as will best suit the headings, but the arrangement should be consistent within a table and from table to table or comparable data. If a wide table uses the page turned 90 degrees (landscape orientation), then the headings must be right side up as viewed by the reader from the long loose side edge. However, the page number on a page that has been turned for a long table remains right side up in the upper right corner (portrait orientation), in the normal reading position just like numbers on all other text pages.

Only the first word in a heading is capitalized. The units of the identical items in a column (such as feet, cm, gm) must be included in the heading. The data must be understandable from the table alone, although they are interpreted in the text. Uncommon abbreviations in headings should be avoided if possible, but if used, they must be typed to be read in full from the right hand side of the table, or as footnote. The items should be spaced for easy reading. However, single-spacing is desirable for long columns of data. Ditto marks are never used to separate identical items of the same rank. Items should be centered in the area below the headings and must be aligned with the right-most digit in each column. However, if the numbers contain decimal points or dashes, then the decimal points or the dashes must be aligned regardless of the digits or letters on either side of the period or dashes.

Decimal numbers less than 1.0 should be preceded by a zero (e.g., 0.72 not .72). Decimal numbers should not include more digits than the methods of measurement allow. Only the last digit can be subject to error. Note the difference between 2, 2.0 and 2.000000 depending on the accuracy of the measurement.

Including large tables that exceed the 6 x 9 inch area of the permissible text are discouraged. If it is necessary to include large tables in a thesis, one may convert the body of the table to an image, such as a .jpeg, and insert or paste it on the page; however, the table's caption must remain the same size and type font used in the text of the thesis. Another method is to use standard typing and continue a large table on successive normal pages. Such pages should begin with the title "Table" followed by the table number, a period, table title, and (Page x of y) in parentheses, centered over the table. All top and side headings must be repeated on each continued page in the same spacing as on the initial page. A page of a continued table should not have a line at the

bottom until the last page of the table is finished.

Alternately the original table, typed on horizontally oversized paper equivalent to the quality of standard thesis paper, may be bound directly in the thesis providing the following items are adhered to. The standard margins must be retained even on the oversized unfolded page: 1.5-inch left margin, 1 inch on the other three sides. The page number remains in the upper right corner of the folded-open page. Oversized and folded photographic paper is not acceptable in a thesis.

The large page must be laid out and folded to fit the standard page requirements with these precautions. Since the right edge of a thesis is trimmed off in the binding process, the right edge fold of an oversized page must be at least 0.5 inches from the edge of the normally bound pages (i.e., beginning at the left edge, the first fold must be 8 inches from the edge). If the table (including margins) is longer than 14.5 inches, then a second fold is required at 14.5 inches to avoid catching the folded edge in the binding. No oversized page should exceed 21.5 inches in width.

Long vertical tables are not to be placed on long folded pages. They must be treated as continued tables on consecutive pages. If continued on consecutive pages, the title and headings are repeated on each page. In addition, the page and total page number in parentheses is added to the title, for example, "(Page 1 of 2), (Page 2 of 2)."

Footnotes to Tables

Footnotes to tables should be avoided if possible, but if used, they must be indicated by symbols (e.g., *, #, +) rather than numbers to avoid confusion with the tabular data numbers. The symbol should be placed after the first item to which it refers as the table is read from left to right and from top to bottom. Footnotes are placed two spaces below the solid line at the bottom of a table,

with the symbol indented 0.5 inches from the left edge of the table and followed immediately in the next space with the first capital letter of the footnote. Footnotes longer than the width of the table should be single-spaced and carry over to the left edge of the table like a paragraph. Subsequent footnotes for a given table are double-spaced below the first footnote in a similar manner. (Refer to the earlier section on footnotes in the text.)

Footnotes should be short notes. Extensive descriptions of the experimental methods or equipment used to obtain tabular data should be in the text, not in footnotes. In multiple tables of similar data, the symbols should be the same for the same footnotes in each respective table.

Computer Printout and Other Machine Data

The quality of printout and paper used by many computers and printers may be acceptable in a thesis. If, however, pages are oversized, have improper margins, or poor quality ink intensity, it can be assumed that they will be viewed as unacceptable. The original must be clean and printed in black or photocopied for mounting similar to photographs. The Thesis Examiner (in consultation with the Dean of the Graduate College) will be the sole judge to the acceptability of the product of such processes. Please consult the Thesis Examiner in advance.

Figures

Figures include all types of illustrative materials such as drawings, curves, graphs, charts, maps, or photographs. A figure should not be used simply to repeat data in a table or in the text. Students may use figures in the text and include the raw data in tabular form in the Appendix. A small figure may be inserted in the text between paragraphs shortly after it is mentioned and separated from the text by two double spaces both above and below the figure. Full-page figures should be inserted on the next numbered page following the page on which they are first cited in the text. In some theses, figures may be removed from the text and placed on consecutive pages as one of the last chapters before the Appendix and so identified in the Table of Contents. A figure is always referred to by number, e.g., Figure 35. In the text the word figure must be written out, but when used parenthetically, the reference may be abbreviated to: (See Fig. 35). All figures must be kept within the standard margins for text material (1.5-inch margin on the bound edge side and 1 inch for the other three sides).

If using the APA Figure format, refer to the *Publication Manual of the American Psychological Association*. (7th ed), Washington, D.C.: American Psychological Association (APA), 2019.

Numbering and Titles

Each figure title must be placed a double-space below the bottom of the figure, beginning with the word “Figure” followed by the number, followed by a period and the title of the figure, and all with initial capital letters of major words. The title on the figure page must be identical to the title shown in the List of Figure--in the preliminaries. If the full figure title is shorter than the width of the figure, then it must be centered. If the title is longer than one line,

the word “Figure” must be flush with the left margin of the page, and carry over lines should be single spaced and indented to begin under the letter “g” in “Figure.” No title may extend beyond either the left or right margin of the figure or beyond the margins for written text. Titles of similar figures should be consistent in terminology and grammatical form.

All figures should be numbered with Arabic numerals, consecutively, throughout the entire thesis. Students are also allowed to use decimal points for numbering figures (i.e., Figure 5.12, which refers to the 12th figure in Chapter 5). If decimal points and chapter numbers are used, this number must be the same as the actual chapter in which the figure appears. If figures are removed from the text and placed on consecutive pages in a separate chapter, all figures must be numbered with consecutive Arabic numerals.

Figure titles should be descriptive, yet concise. Explanations, detailed descriptions, interpretations, or conclusions of figure content may be included as footnotes to the figure, as well as described in the text reference. Explanations, detailed descriptions, interpretations, or conclusions should not be incorporated into the figure title.

Arrangement

A figure may be placed on the page so that it is read in the normal position with the page vertical, or with the page turned 90 degrees (landscape orientation) so that it is read from the long side opposite the binding. In either case, the title is at the bottom of the page as read. The page number remains upright (portrait orientation) in the upper right corner of the vertical page, even when the page is turned for a long figure.

Separate figures may be placed vertically in sequence when the size allows multiple figures on the same page. Separate figures should not be placed side-by-side, unless they share the same figure number and title and are used for comparison or contrast.

Alternately, the original figure, typed on horizontally oversized paper equivalent to the quality of standard thesis paper, may be bound directly in the thesis providing the following items are adhered to. The standard margins must be retained even on the oversized unfolded page: 1.5-inch left margin, 1 inch on the other three sides. The page number remains in the upper right corner of the folded-open page.

Since the right edge of a thesis is trimmed off in the binding process, the right edge fold of an oversized page must be at least 0.5 inches from the edge of the normally bound pages (i.e., beginning at the left edge, the first fold must be 8 inches from the edge). If the figure (including margins) is longer than 14.5 inches, then a second fold is required at 14.5 inches to avoid catching the folded edge in the binding. No oversized page should exceed 21.5 inches in width.

Labels, Lettering, and Spacing

Labels or ordinates and abscissas should be placed parallel to the appropriate coordinate, in the direction of that coordinate, away from the intersection (from the lower left corner). Lettering on figures should be expertly and neatly done. Figures should not be enclosed in boxes. Lines on the top and right side should be avoided. The lines should be drawn with black ink, and

coordinate axes should be heavier than other lines. Excess grid lines or crowded intervals on the axis must be avoided. The inner data must not exceed the maximum interval shown on either axis. The name of the trait represented by the axis should be short, centered, and include units in which the trait is measured.

The lines in a figure should be clearly labeled and identified. Colored inks are never allowed in doctoral theses. Different lines must be shown by different kinds of black lines made with dots or dashes. Not more than four or five lines should be shown on the same figure. Bars in bar graphs should all be the same width with various degrees of stippling to indicate the various types of data being shown. Single figures with few labels are the easiest to comprehend.

Legends and Footnotes to Figures

When a legend is required, such information should be brief, placed before the title of the figures, and ended with a period, so long as it does not violate the standard margins. Footnotes to a figure should follow the directions given for Footnotes to a Table, in this Thesis Manual. As a last resort, if the legend is too long to be included on the same page with the figure, then the entire legend should be centered on the numbered page following the figure, and designated as: Legend for Figure 34 (Followed by the legend with the carry-over lines single-spaced and indented two spaces). No other text material can appear on such a legend carry-over page.

Appendix

An appendix is optional. If included, appendices should be used to present material that is supplementary, but not vital, to the understanding or interpretation of the main thesis. Included here is raw tabular data from which figures in the text were drawn, methods or preliminary preparations, pilot study results or data that might be useful to someone else, questionnaires, letters, copies of forms, proofs of propositions or theorems, descriptions of complex equipment, and photographs of displays.

An appendix is introduced with a half-title page (i.e., no chapter number), containing only the page number in the upper right corner and the word “APPENDIX” in capital letters, centered just above the middle of the page. If various types of appendix material are included, the sections must be denoted in all capital letters (i.e.,

APPENDIX A, APPENDIX B, etc.) on each half-title page. The standard margins apply to appendices. The presentation should be consistent with the manner of presentation of the text. Complex appendices should be short, single-spaced, and condensed to show information content, not to present interpretations or conclusions.

Departmental Regulations

Individual departments may include statements regarding their departmental regulations on the preparation of the graduate thesis manuscripts. Such statements may be included in the Appendix. The departmental regulations cannot conflict with the regulations of the IIT Thesis Manual.

Bibliography

There must be only one bibliography in a thesis. The bibliography must include all references cited in footnotes, text, and appendix. It should not include un-cited references or references unseen by the student, unless the work is clearly identified in that way. A bibliography citation identifies the whole work and not just a specific part of an article. (A footnote designates the specific part or page of the whole work listed in the Bibliography.) It may be helpful to review the section on Footnotes.

The Bibliography should begin with the word "BIBLIOGRAPHY" centered on the top of the page, followed by a triple-space above the first reference. The reference number or author's last name should begin at the left margin 1.5-inches from the edge of the paper. Carry over lines are single-spaced and indented 0.5 inches. If numbered references are used, the periods or parentheses following the numbers should be aligned in the same vertical column, followed by two spaces before the author's last name. Reference citations are separated by double spaces. If the Bibliography is continued on a second page, the division must be between entries. The heading must not be repeated on the second page.

A reference consists of three main parts: the author's name, the title of the reference, and details of publication (including the publisher's name and address for a book). In all cases the name of the author should precede the title of the reference. A reference must be complete. Abbreviations such as *et al.* and *ibid.* are never used in a bibliography. Each author's name should be retyped in each reference. Ditto marks are never used, and a long dash to indicate repetition of an author's name is not permitted.

Authors' first names are rarely used, unless required to distinguish them from other authors with the same last name and first name initial. If first names are used, they should be used for all authors in that entry. Although some technical journals allow incomplete references, IIT requires complete bibliographic citations: each entry must give the titles of articles in full, the volume and number, as well as inclusive page numbers. Titles of books, journals, and documents must be underlined or italicized. Inclusive pages of chapters or sections from books are to be provided. Abbreviation of the names of journals must be uniform and follow the accepted abbreviations in the student's field. Abbreviations are never permissible in the titles of books or articles. If brackets are used to represent references in the text, then brackets must also be used in the Bibliography.

In general, bibliographic references may be cited in the text in several different styles (but all alike in any one thesis). The following styles are recommended:

- References are numbered in alphabetical order, in the Bibliography, and referred to by number in the text. This style will cause major problems if references are added during the preparation of the manuscript.
- If cited material runs to more than one page, the range of pages is included in the in-text citation with the author's name (such as 235-36 or 399-400). No punctuation is used between the name and the page number. A reference with the authors' last names and page number will appear in the text as (Smith and Patterson 390-431) and will be listed in alphabetical order in the Bibliography as:

Smith, M.P., and W. A. Patterson,
W.A. Numerical Methods in
Large Scale Systems. 3rd ed.
New York: John Waters and
Sons, 1994.

- An abbreviated last name of the first author and the year of publication may appear in the text. For example, [Joh94] as an entry in the text will appear in the Bibliography as:

[Joh94] Johnson, J.K., P.C.
Labudda, and C. F. Wolf.
“Fuzzy Methods Applied to
Electric Power Systems,” IEEE
Transactions on Power Systems.
10.5 (May 1994): 34-46.

- The entries in the Bibliography must be listed in chronological order for multiple entries with the same authors. For example, [Smith78] and [Smith86] in the text are listed in the Bibliography as

[Smith78] Smith, H. W., and K.
Basa, 1978...

[Smith86] Smith, H. W., and K.
Basa, 1986...

- For the same first author, entries must be listed alphabetically by the second author’s last name. For example, [Smith 92] and [Smith 88] in the text are listed in the Bibliography as:

[Smith 88] Smith, H. W., and R.
Ambrosini, 1988...

[Smith 92] Smith, H. W., and K.
Basa, 1992...

- When a work lacks facts of publication, date or page numbers, you must use: n.p. (for no publisher or no place of publication given), n.d. (for no date of publication), and n.page. (for no pagination given). }

- If you refer to the material by one author who is referring to another source, you should indicate the publication in which you found the material as well as the original source. Such a reference would appear in the text as (Jones 23) and then as footnote:

William Jones, Lectures on Thesis
Preparation 210, as cited by
Coulton.

In such a case, only “Coulton, G. C.
Documentation. Boston: Pelican
Books, 1957.” will appear in the
Bibliography entry.

If there are any further issues regarding the correct format for in-text citations and/or bibliographical entries, refer to one of the following style manuals:

American Institute of Physics. *Style Manual for Guidance in the Preparation of Papers for Journals* (4th ed.). New York: American Institute of Physics.

IEEE Editorial Style Manual
http://www.ieee.org/conferences_events/conferences/publishing/style_references_manual.pdf

Gibaldi, Joseph. *MLA Handbook for Writers of Research Papers*. 6th ed. New York: Modern Language Association of America, 2003.

The Chicago Manual of Style. 15th ed.
Chicago: University of Chicago Press,
2003.

Publication Manual of the American Psychological Association. (7th edition).
Washington, D.C.: American
Psychological Association (APA), 2019.

Ordinarily, the Bibliography should not be divided into sections; occasionally subsections containing specialized documents may be used such as “Documentary

References,” “Legal References” and “Non-print Media.”

- [Ada83] Adam, S., L. Holten, and O. Gjerde. “Design of the Measurement System for State Estimation in the Norwegian High-Voltage Transmission Network.” *IEEE Transactions on Power Apparatus and Systems*. 102.12 (December 1983): 3769-77.
- [Abb88a] Abbasy, N., and S. Mokhtari. “Optimal Set of Measurements for Estimation of System States in Large-Scale Networks.” *Electric Networks and Systems*. 15 (June 1988): 311-332.
- [Abb88b] Abbasy, N., and A. Shah. “An Overview of Control Systems Static State Estimation.” *Proceedings of the 4th International Conference on Advanced Science and Technology*. Chicago, IL (March 1988): 286-96.
- [1] Abuk, Z., “Bad Data Identification Method for Linear State Estimation.” *IEEE Transactions on Energy Systems*. 8.3 (August 1990): 894-901.
- [1] Abuk, Z., “Bad Data Identification Method for Linear State Estimation.” *IEEE Transactions on Energy Systems*. 8.3 (August 1990): 894-901.
- [2] Abuk, Z., and M. K. Anderson. “A Fast Algorithm for the Weighted Least Absolute Value State Estimation.” *IEEE Transactions on Control Systems*. 46.1 (February 1991): 1-8.
- [3] Bieronan, G.J. *Factorization Methods for Discrete Sequential Estimation*. New York: Academic Press, 1977.
- Clements, K. A., P. W. Davis, and K. D. Frey. “An Efficient Algorithm for Computing the Weighted Least Absolute Value Estimate in Power System Static State Estimation.” *Proceedings of IFAC Symposium on Power System and Power Plant Control*. Seoul, Korea (June 1989): 371-74.
- Deb, K. S., P. E. Larsen, and L. P. Haju. “On-Line Sequential State Estimation in Electric Energy Systems.” *Presented at the 4th PSCC*. Grenoble, France, Paper #3.3/7 (May 1972).
- Zimmermann, H.J. *Fuzzy Sets, Decision, and Expert Systems*. Boston: Kluwer, 1987.

Bibliography Citation Styles Examples

MLA, Journal Article

Beatie, Tony and Paul Stewart. "The Real Dirge: Music Metaphors of Modernity." *The Music Journal of the Arts* 2.1 (2007): 71-80.

APA, Journal Article

Taylor, G. G., & Paul, J. (2012). How children construct playgroups: Strategy Change. *Developmental Psychology*, 33(2), 120-140.

Chicago, Journal Article

Klein, Katherine. "Marketing Millennials in the Industrial Gateway." *Journal of Business Marketing* 104 (2009): 439-58.

IEEE, Journal Article

[4] Y. T. Davis-West, "Wireless Feasibility and Efficacy Studies," *IEEE Trans. Electron. Devices*, vol. ED-16, pp. 56-76, Feb. 2012.

AIP, Journal Style

[19] L. M. Pecora, T. L. Carroll, G. A. Johnson, D.J. Mar, and J. F. Heagy, *Chaos* 7, 520 (1997).

Summary of Required Items

The following list contains the items that must follow the instructions in this Thesis Manual:

1. The title page and page ii are not numbered, unless page ii contains the copyright.
2. Table of Contents page provides an outline of the information contained in the thesis.
3. All chapters must be double spaced.
4. Proper margins must be maintained on all pages (1.5 inch on the left and 1 inch on the other three sides).
5. Thesis must be consistent in style and format.
6. Pagination and page number locations must be 0.5 inches above the bottom of the page and centered, for Preliminary pages. They must be 0.5 inch inches below the top of the page and 1 inch from the right edge for Text pages.
7. Titles of tables are always at the top of the table; titles of figures are always at the bottom of the figure. Only the first letters of the principle words are capitalized.
8. The first line of every paragraph is indented 0.5 inches, and a period at the end of a sentence is followed by one space.
9. Section headings are separated from the text by a double spaces, both above and below.
10. Second order sub-sections may be indented 0.5 inches, but must have the text following on the same line.
11. Complete references are required and are found in the Bibliography, located at the very end of the manuscript.
12. The final thesis must be converted to PDF, before it is uploaded.
13. The final thesis PDF must have the thesis adviser's signature on the title page, and the title page must be the same size, color, and orientation as the rest of the document.