

The ability to write cogently, concisely, and clearly in an acceptable academic format and to present the results of your research orally to a diverse audience are skills you must develop to be a success in academic research and in our program. At the same time, you will be learning skills essential to success in your working life after graduation, as the ability to communicate clearly in written and spoken English is one of the most important elements to professional success. You will regularly be expected to submit research papers and project reports as you progress through our program. Here's some key advice to help you succeed.

Format of Research Papers: Unless your professor gives you different instructions, you should prepare ITM research papers in the formats prescribed by the *Publication Manual of the American Psychological Association*, (commonly referred to as *APA*), which are very common styles in use for scholarly publications and academic papers. APA format is the ITM Department format and is the most common in computing disciplines. Among other things, APA format means that you should submit your paper typed in 10, 11, or 12-point type (no larger than 12-point), double-spaced, with 1 inch margins on one side of 8½ inch by 11 inch paper or the digital equivalent. Quotations, figure captions and the list of references should all be double-spaced. Devote separate pages to each figure, each table and the list of references, and number all pages after the first. Attach a cover sheet listing the paper title and the name and email address of the author. If submitting electronically, please submit as a PDF file or in Rich Text Format. Most word processors can save as RTF. Your professor may prescribe specific required or acceptable electronic formats. (See pages 4 of this document for information on formatting papers submitted for academic journal or conference publication.)

Title: ALWAYS include a title! Make your title short and specific. Ideally, titles should be 5 or 6 words long, never more than 10.

Length: Make papers as concise as possible; 8 to 12 pages should be reasonable for an undergraduate research paper, while 15 to 20 pages would be more common for a graduate research paper. Note that your professor may prescribe a different length expectation and in some cases they may be quite a bit shorter. Please count only pages containing body text; figures, tables, the abstract, references, bibliography, and appendices do not count toward the page total.

Headings: Please try to use only one level or at most two levels of heading.

Running Head: APA guidelines no longer require a Running Head in page headers; just put the abbreviated title of your paper in all uppercase letters ("all caps") in the header of each page.

Figures and Tables: Please submit copies of any figures and tables on separate pages. They should have captions that are interesting, that are written in complete sentences, and that fully explain and interpret the exhibit without forcing the reader to refer to the text. Conversely, the reader should not have to refer back and forth from the text to the figures to understand the paper. You should refer to figures where appropriate with "(Figure 1)," but you should explain the meaning and implications of your data fully in the text. Do not require the reader to interpret the figure to understand what you have done, as in "Figure 1 shows the outcome of this survey." Tables should list information in some obvious logical order.

References: Cite references in the body of the text: "Shrump (1998) quibbled that ..." or if 1998 was a prolific year for Shrump, "(May 1998)." If the author is not named in the body of the text, then use the form (Shrump 1998) for your citations. Include **all references cited** in a bibliography which according to APA standards should be titled "References". Alphabetize your references by the name of the first author or the first word of the reference. Entries may be single-spaced but each entry should be separated from the next by a blank line. Ensure all quotes and paraphrases are properly cited in the body of your paper, and ensure all sources cited are included in your reference list.

For article references use the form

Smith, James Q. (1978) Title of article. Title of Journal or Periodical, 10(5) [Volume(issue)] 45-50 [page numbers].

and for book references,

Toklas, Alice B. (1947) Book title. Publisher's name.

and for references that are collections of papers,

Beedle, Albert A. (1979) Title of chapter. In J.J. Fox, ed. Book title. Publisher's name, 556-572 [page #s].

and for references that are online,

Bly, Laura (2000, April 21) Upstart airfare site beats the big boys. USA Today.com, www.usatoday.com/life/travel/leisure/2000/ltl227.htm. (use a DOI if available; see notes below)

- ◆ Note that APA style requires indentation of the second and subsequent lines of references, so each reference is *outdented*.
- ◆ Book and periodical titles must be italicized, and only the first word of a book title should be capitalized unless subsequent words would otherwise be capitalized (i.e. proper nouns, etc.)
- ◆ If there is no author given, cite the title, or if it is published by a government agency, association, or corporation, cite the name of the agency, association, or corporate entity. You may use a short form for in-text citations, i.e. ABA for American Bar Association.
- ◆ If the reference is online, include the URL (web address) of the web page. *If the page is likely to change over time*, add a retrieval date.
- ◆ If a reference includes a DOI (Digital Object Identifier), always include the DOI in your reference—even if it is a book or journal.
- ◆ Your reference list should include all sources used in the preparation of your paper, even if there are no in-text citations to the reference.

In-text citations are essential in a research paper as they provide the evidence and findings of fact to support your thesis statement.

A research paper without a significant number of citations throughout the paper is just an essay, and essay is a form rarely used in the disciplines taught in our department. In-text citations are required in a research paper for it to be valid academic writing. Generally a research paper without in-text citations will lose one and possibly two letter grades.

Footnotes: Avoid footnotes. If what they contain is important, put in your text. If not, don't distract the reader from what is important. Footnotes are not a part of APA-formatted papers.

Writing Papers: The following steps suggests an effective way of organizing a paper (it's just a suggestion):

1. Describe the problem;
2. Discuss previous work in the field and any necessary background information
3. Explain what you did, how you did it, and what obstacles you encountered; **or** provide specific findings of fact and evidence in other research that support your proposed solution or thesis;
4. State your solution or conclusion;
5. List the resulting benefits, both quantitative and qualitative; and
6. If applicable, provide an appendix giving particulars of any models used or data collected during the research.

In writing your paper, explain your work so readers outside the field can understand it. If you must use a specialized term, abbreviation, or acronym, make sure you define it; write out an acronym or abbreviation the first time it appears and enclose it in parentheses immediately afterwards. Never assume your reader "already knows" the acronym or abbreviation!

◆ Here is a possible step-by-step breakdown:

- ◆ Choose an area of interest to you to start your topic selection
- ◆ Search for publications—both in print and online—related to your topic
- ◆ Narrow your topic to refine your search results
- ◆ Formulate a thesis statement to guide your research
 - ✓ A good thesis statement is critical; it's the answer to the question that your paper explores and clearly delineates the argument that will be presented in your paper (see the humorous but accurate explanation to the right →→→)
- ◆ Scan books to see if they are relevant
 - ✓ Use the Table of Contents & index to quickly locate useful information
 - ✓ The table of contents for many books is now available online at the publisher or on amazon.com
 - ✓ If you find a book you need at Barnes & Nobles or on amazon.com, go to our library and odds are that if they don't have it that they can get it on interlibrary loan
- ◆ Make notes on, or photocopy, interesting passages as you encounter them
- ◆ Make notes as you read to capture thoughts, questions, and ideas
- ◆ Refine your research question and do further information gathering
- ◆ Compose and write down your working thesis
- ◆ Review and reflect on work done in the field already; discuss any necessary background information
- ◆ Construct your argument, with the main points organized in an **outline**
- ◆ Write a rough draft, expanding the outline to fulfill paper length requirements
- ◆ Include quotes—**with citations**—that support your points
- ◆ Revise your rough draft to ensure a strong, logical argument
- ◆ Document *all* works referenced in the preparation of your paper and use necessary and appropriate in-text citations
- ◆ Revise your paper for spelling, punctuation and grammar errors
- ◆ Review your work and edit again for conciseness
- ◆ Print out the final revision of your paper and bibliography or save as PDF or RTF file as necessary

Hulk trying to craft cogent thesis statement.

It tricky to condense entire argument into focused declarative phrase and still assert Hulk's conclusions.



The Thesis Statement: A thesis statement is a sentence or a group of sentences that summarizes the main idea of a piece of writing, such as an essay, research paper, or thesis. *Ideally*, if well crafted, it should be a single sentence. It presents the central argument or claim that the writer is making, and it serves as a roadmap for the rest of the content. The thesis statement usually appears at the end of the introduction and provides a clear and concise statement of the writer's position on a particular topic.

A strong thesis statement should be specific and arguable. This means it should not be a simple statement of fact that everyone would agree with. Instead, it should present a viewpoint or stance that can be supported with evidence and reasoning. The thesis statement should also be concise and to the point, providing the reader with a clear understanding of what the writer will be discussing in the following pages. It should never be self-referential, i.e. there is never a need to say "This paper will..." That is implicit and unnecessary, and it distracts from the impact of a well-crafted thesis statement. In essence, the thesis statement acts as a guide for both the writer and the reader, as it sets the tone for the writing and provides a framework for understanding the content that follows.

The Outline: An outline is a systematic and hierarchical arrangement of ideas and information that is used as a guide for writing or organizing content. It breaks down larger, complex topics into smaller, manageable sections and provides a clear structure for the final product. An outline can be used for a variety of content types, including essays, speeches, research papers, books, and more. An outline can help the writer stay focused, ensure that all important points are covered, and provide a clear organization for the final product.

Typically, an outline follows a hierarchical format, with main ideas represented as Roman numerals (I, II, III, etc.), supporting ideas as capital letters (A, B, C, etc.), and details as Arabic numerals (1, 2, 3, etc.). Each level of the outline provides more detail and specificity, leading up to the final product. The ideas are expressed as bullet points and normally don't need to be full sentences—and *never* paragraphs.

Use of Wikipedia: While *Wikipedia* is a good starting point for research to get an overview and point you to available resources, you cannot cite or quote *Wikipedia* in an assignment in Illinois Tech's Information Technology & Management curriculum. *Wikipedia* is a wonderful resource, but due to its community-edited nature it is not acceptable as a source of material for use in academic writing. Verify the information from *Wikipedia* through an independent reference. Quality *Wikipedia* articles will always provide good references; use them.

Live, In-Person Help:

- ◆ **The IIT Writing Center** (<https://www.iit.edu/humanities/student-resources/writing-center>) exists only to HELP YOU WRITE YOUR PAPER. Typically, you will take a project or paper assignment to the center, where a tutor will work one-on-one with you to assist with the writing process. There are tutors there who are especially trained to work with students for whom English is a second language but they certainly will work with anyone. The Writing Center is in Siegel Hall rooms 232 and 233. Please make an appointment online on the Writing Center **webpage**. Appointments need to be made 24 hours in advance. When possible, the Writing Center also accepts students on a walk-in basis without an appointment, but there is no guarantee of this.
- ◆ **Illinois Tech's Galvin Library** has *Reference Librarians* who are there specifically to assist you in your research and preparation of citations. DON NOT BE AFRAID to ask a Reference Librarian for assistance; that's what we are paying them to do! If you have specific questions about preparation of your references, they are the experts and they are there to help. They also offer classes to help you learn how to best use library resources. You can also make a research appointment to receive specialized help with your research at <https://iit.libcal.com/appointments>. More information can be found in the library guides page at <https://guides.library.iit.edu/>; resources to assist you in research and citations can be found at <https://guides.library.iit.edu/researchtools> and <https://guides.library.iit.edu/general-info>.

A good general guide to using library resources can be found at <https://guides.library.iit.edu/internationalstudents>. Reference sources for information technology are at <https://guides.library.iit.edu/informationtechnology>. The Reference Librarian for specific information technology and management queries is Charles Uth, uth@iit.edu / (312) 567-5319.

Fundamentals for International Students is a library workshop/tour to help you get familiar with the library building and services, and is usually scheduled during the orientation week or the first two weeks of classes. Tour dates are announced on the library websites and IIT Today. The International Student Library guide is at <https://guides.library.iit.edu/internationalstudents>.

Additional Information:

- ◆ For a fine discussion of writing, read William Strunk Jr. & E.B. White's *The Elements of Style*, Allyn & Bacon, Needham Heights, MA.
- ◆ For definitive guidance for preparation of a research paper in APA style, see the American Psychological Association's *Publication Manual of the American Psychological Association*, American Psychological Association, Washington D.C.
- ◆ For a more complete, formal treatment of the process of preparing a paper for publication, see The University of Chicago Press *The Chicago Manual of Style*, University of Chicago Press, Chicago, IL.
- ◆ For sound advice on figures, refer to the series of books by Edward R. Tufte: *The Visual Display of Quantitative Information*, *Envisioning Information*, *Visual Explanations*, and *Beautiful Evidence*, all from **Graphics Press, Cheshire, CT**.

Other very useful resources for preparing papers:

- ◆ **OWL at Purdue: The Online Writing Lab** at Purdue University: https://owl.purdue.edu/owl/purdue_owl.html
- ◆ **The IIT Writing Center:** <https://www.iit.edu/humanities/student-resources/writing-center>
- ◆ **57 Tips for Writing Your Term Paper** (archived but still valuable): <https://web.archive.org/web/20070226210837/http://www.degreeututor.com:80/library/online-assignments/termpaper-writing>
- ◆ **50 Ways to Increase Your Chances for an "A" Research Paper** (also archived but still valuable; we have the author's permission to update and republish this but we have to get Rasmussen University's): <https://web.archive.org/web/20180507084831/http://www.rasmussen.edu/student-life/blogs/main/research-paper-strategies/>
- ◆ **Writing Guides, Indiana University:** <https://wts.indiana.edu/writing-guides/index.html>
- ◆ **APA Style:** <http://www.apastyle.org/>
 - ◇ **APA Style official APA Handouts and Guides on APA citation styles and bibliography entries:** <https://apastyle.apa.org/instructional-aids/handouts-guides>
 - See especially:
 - Avoiding Plagiarism Guide* <https://apastyle.apa.org/instructional-aids/avoiding-plagiarism.pdf>
 - In-Text Citation Checklist* <https://apastyle.apa.org/instructional-aids/in-text-citation-checklist.pdf>
 - Common Reference Examples Guide* <https://apastyle.apa.org/instructional-aids/reference-examples.pdf>
 - Student Paper Setup Guide* <https://apastyle.apa.org/instructional-aids/student-paper-setup-guide.pdf>
- ◆ **Citing Sources and Bibliographic Styles:** This site provides information about citing sources, plagiarism and three bibliographic styles approved by the **Illinois Tech Graduate College**: *APA style Guide*, *MLA Style Guide*, and *Chicago-Turabian Style Guide*: <https://guides.lib.berkeley.edu/publichealth/style>. A similar resource covering the same set of styles plus IEEE is <https://pitt.libguides.com/citationhelp> (All work submitted for courses and research in Information Technology and Management should be in APA style unless specified otherwise by your instructor.)
 - ◇ **Easybib.com** is an online resource with an accurate automatic bibliography and citation maker for APA, MLA, and Chicago style formats: <https://www.easybib.com/>

- ◆ **Zotero** bibliographic software as a **free** standalone program for Windows, Mac or Linux with connecting extensions available for Chrome/Edge, Firefox, and Safari: <http://www.zotero.org/>. Zotero is more than just a bibliography tool; it is a free, open-source, easy-to-use tool to help you collect, organize, annotate, cite, and share your research.

Submission of Research for Academic Publication: A key to submission of research for academic conference or journal publication is to ensure that they are correctly formatted for submission. Each conference or journal will have their own format; here are some of the most frequently used.

- ◆ **ACM Journals, Proceedings, and Conferences:** The current ACM publications submission template for Microsoft Word is at http://www.itm.iit.edu/data/ACM_submission_template.docx. Use this to format all ACM paper submissions. If a paper does not perfectly match this template, it may be rejected. If a paper is accepted, a new template will be applied before final submission; full instructions for submissions and the additional templates are at <https://www.acm.org/publications/authors/submissions>.
- ◆ **IEEE publication submission templates:**
 - ◆ *IEEE Conference submission template* for Microsoft Word: <http://www.itm.iit.edu/data/IEEE-conference-template-letter.docx>. Instructions for use of the template are at <https://www.ieee.org/conferences/publishing/templates.html>.
 - ◆ *IEEE CS Magazine submission template* for Microsoft Word: <http://www.itm.iit.edu/data/IEEE-CS-Magazine-template.docx>.
 - ◆ *IEEE Transactions template* for Microsoft Word: <http://www.itm.iit.edu/data/IEEE-Transactions-template-and-instructions-on-how-to-create-your-article.doc>, while specific instructions for use of these templates is at <http://www.itm.iit.edu/data/IEEE-Transactions-instructions-only.pdf>.
 - ◆ There are a variety of templates for IEEE publications and you can ensure that you select the correct one using resources at <https://journals.ieeeauthorcenter.ieee.org/create-your-ieee-journal-article/authoring-tools-and-templates/tools-for-ieee-authors/ieee-article-templates/>.
- ◆ **Other Resources:** For a very nominal cost you can use a commercial service, **SciSpace**, to format your paper for submission for publication at <https://typeset.io/>. If it's just one paper, you may even be able to use their free trial option. They also offer 40,000 Journal templates to format your paper for publication in journals and conferences published by **IEEE**, **ACM**, **Elsevier**, **Spring**, **Wiley**, and many more.

Thesis Submission for Master of Science Students

Graduate students submitting a thesis in partial fulfillment of their degree requirements must read and be very familiar with all of the references cited below. A mandatory thesis preparation discussion is held at the beginning of every semester to assist graduate students with the preparation of their theses. The exact date and time is emailed to all graduation applicants by the Office of Graduate Academic Affairs. (<http://Catalog.iit.edu/graduate/academic-policies-procedures/thesis/>)

- ◆ **Thesis Examination:** Details for preparation and submission of your Illinois Tech thesis as well as the thesis examination process are on the **Thesis Examination** page at <https://www.iit.edu/gaa/thesis>. Every thesis-option Master of Science student should become very familiar with all of the content on this page.
- ◆ **Graduate Thesis Manual:** Detailed instructions about how to format your thesis for submission is found in the 2021 edition of this manual at <http://catalog.iit.edu/graduate-thesis-manual/>. (PDF version at <http://itm.iit.edu/data/2021GraduateThesisManual.pdf>.)
- ◆ **Thesis Templates:** The Microsoft Word template for your Illinois Tech thesis is at <https://www.iit.edu/gaa/thesis/writing-thesis-using-ms-word>. The LaTeX template and information is at <https://www.iit.edu/gaa/thesis/latex-thesis>.
- ◆ **Required Forms:**
 - ◇ **Masters Thesis, Project Review, or Exam Scheduling (Form G300)** Students must arrange their committee with their academic adviser by the end of the third week of classes in the term in which they will take the examination, and the **G300 Form** with committee member names and the examination date must be submitted to the **Graduate Office of Academic Affairs (GAA)** no later than two weeks prior to the exam date. The *Masters Comprehensive/Ph.D. Qualifying Exam Results* form (**Form G303**) will be sent to the Department for completion as a result of submission of form **G300**, but the **G303** form is never available to students. Form **G303** will be completed and submitted by the department.
 - ◇ **Final Thesis Approval (Form G501)** This form is due at least nine days before the end of the semester, during the Fall and Spring terms, and five days before the end of the semester, for Session B Summer term.
- ◆ **Other Important Web References for Master of Science Thesis Students:**
 - ◇ **Graduate Academic Affairs: Dates and Deadlines:** Thesis dates and deadlines for the current term. This is a **must-read** for the term in which you will complete your thesis. <https://www.iit.edu/gaa/students/dates-and-deadlines>
 - ◇ **Graduate Academic Affairs: Thesis Examination FAQs:** <https://www.iit.edu/gaa/students/faqs>
 - ◇ **Graduate Catalog: Graduate Academic Policies and Procedures: Thesis:** <https://catalog.iit.edu/graduate/academic-policies-procedures/thesis/>
 - ◇ **Graduate Studies Handbook: Examinations:** This includes information on Thesis Oral Examinations and the required composition of Thesis Examination Committees <https://catalog.iit.edu/grad-handbook/examinations/>
 - ◇ **Graduate Studies Handbook: Adviser Relationship - Graduate Student-Faculty Adviser Relationship:** <https://catalog.iit.edu/grad-handbook/adviser-relationship/>
- ◆ **Departmental Thesis Information**

Master of Science students electing to do a thesis should be meeting with their research adviser to discuss the thesis no later than the beginning of the semester prior to their final semester of studies. Each student will be assigned a research adviser based on their research areas of interest. The research adviser will normally also be the thesis adviser and must be a tenured or tenure-track member of the faculty. In the Department of Information Technology and Management this currently includes Professors **Omar, Dawson, Gopal, Rangarajan, and Zhang**. Each faculty member eligible to serve as a thesis adviser will have an ITMT 591 section scheduled each term. Students will register for ITMT 591 for terms in which they will conduct thesis research. Questions about departmental policies for student research and research adviser assignments should be directed to ITM Department Chair Professor **Gurram Gopal**, 312.567.3651 / Galvin Tower 15F3-2 / gopal@iit.edu.

 - ◇ **Research Faculty areas of interest:**
 - ✓ Associate Professor **Maurice Dawson**: Cybersecurity, Internet of Things, software assurance
 - ✓ Professor **Gurram Gopal**: Management, business, customer relationship management, data analytics and machine learning, e-commerce, IIOT, and supply chain optimization
 - ✓ Associate Professor **Marwan Omar**: Cybersecurity, Machine Learning in Cybersecurity, digital forensics, Natural Language Processing Robustness, Virtualization, Cloud Computing security
 - ✓ Assistant Professor **Ann Rangarajan**: Individual, organizational, societal, and cultural factors underlying complex socio-technical systems that impact technology management and applied computer science, as well as computer systems engineering, information systems (IS) innovation and diffusion, and socio-technical factors impacting technology implementations.
 - ✓ Associate Professor **Yong Zheng**: Recommender systems, artificial intelligence, behavior analytics, data mining and machine learning, Natural Language Processing, data management.
 - ◇ **Thesis Proposal:** Prior to commencing work on a thesis, M.S. students will submit a proposal for their thesis to their adviser. Advisers will provide details on what will be required in the proposal. Once it is submitted, students shall make any revisions necessary for approval of the proposal by their adviser.
 - ◇ **Thesis Progress Reviews:** Once students have embarked on their thesis, they should expect their adviser to ask them to meet with the adviser at least once every month for a progress review.
 - ◇ **Thesis Examiner Appointments:** An initial thesis appointment with the Thesis Examiner must occur no later than six weeks before the end of the term in which the thesis will be defended, but may occur earlier. At this meeting students will be expected to share with the Examiner preliminary pages; at least one chapter that has tables and/or figures, if applicable; the appendix, if applicable; and the bibliography.

You must meet with the Thesis Examiner at least three times before you upload your final thesis. This consists of two full document review meetings and a final review/instruction meeting. Please see the full details in the Thesis Examiner FAQ at <https://www.iit.edu/gaa/students/faqs>.

- ◇ **Thesis Committee:** The Thesis Committee must have four members. At least two members must be drawn from Professors Dawson, Gurram, Omar, Rangarajan, and Zhang. Students may elect to have a committee member who is a tenured or tenure track faculty member from outside the department, and may have a fifth outside member who may be a teaching faculty member in the department. Because this examination may be applied as a Ph.D. Qualifying Examination, it is the policy of the department that a minimum of four tenured or tenure-track faculty members must participate in the oral defense of the project.
- ◇ **Thesis Defense:** Students must defend their thesis in an oral presentation before their Thesis Committee which shall constitute the comprehensive examination for their degree. The thesis defense will be open to all faculty and students. At least **two weeks prior** to the thesis defense, the completed thesis must be distributed to each committee member for review and comment. (<https://catalog.iit.edu/grad-handbook/thesis-examination/>.) The thesis must be defended and then approved by the Thesis Committee and must be submitted (with revisions as required by the Thesis Committee) **no later than fifteen days before the end of the term** (Master's Thesis Examination, <https://catalog.iit.edu/graduate/academic-policies-procedures/examinations/>.) The graduate student must be registered in the semester in which the thesis is defended.

Project Submission for Master of Science Students

Master of Science students electing to do a project should be meeting with their research adviser to discuss the project no later than the beginning of the semester prior to their final semester of studies. Each student will be assigned a research adviser based on their research areas of interest. The research adviser will normally also be the project adviser and must be a tenured or tenure-track member of the faculty. In the Department of Information Technology and Management this currently includes Professors **Dawson, Gurram, Omar, Ranarajan, and Zhang**. Each faculty member eligible to serve as a project adviser will have an ITMT 597 section scheduled each term. Students will register for ITMT 597 for terms in which they will conduct project research. Questions about departmental policies for student research and research adviser assignments should be directed to ITM Department Chair Professor **Gurram Gopal**, 312.567.3651 / Galvin Tower 15F3-2 / gopal@iit.edu.

- ◆ **Research Faculty areas of interest:**
 - ◇ Associate Professor **Maurice Dawson**: Cybersecurity, Internet of Things, software assurance
 - ◇ Professor **Gurram Gopal**: Management, business, customer relationship management, data analytics and machine learning, e-commerce, IIOT, and supply chain optimization
 - ◇ Associate Professor **Marwan Omar**: Cybersecurity, Machine Learning in Cybersecurity, digital forensics, Natural Language Processing Robustness, Virtualization, Cloud Computing security
 - ◇ Assistant Professor **Ann Rangarajan**: Individual, organizational, societal, and cultural factors underlying complex socio-technical systems that impact technology management and applied computer science, as well as computer systems engineering, information systems (IS) innovation and diffusion, and socio-technical factors impacting technology implementations.
 - ◇ Assistant Professor **Yong Zheng**: Recommender systems, artificial intelligence, behavior analytics, data mining and machine learning, Natural Language Processing, data management.
- ◆ **Project Proposal:** Prior to commencing work on a project, M.S. students will submit a proposal for their project to their adviser. Advisers will provide details on what will be required in the proposal. Once it is submitted, students shall make any revisions necessary for approval of the proposal by their adviser.
- ◆ **Project Progress Reviews:** Once students have embarked on their project, they should expect their adviser to ask them to meet with the adviser every two or three months for a progress review.
- ◆ **Project Examination Committee:** The Project Examination Committee must have four members. At least two members must be drawn from Professors **Dawson, Gurram, Omar, Rangarajan, and Zhang**. Students may elect to have a committee member who is a tenured or tenure track faculty member from outside the department, and may have a fifth outside member who may be a teaching faculty member in the department. Because this examination may be applied as a Ph.D. Qualifying Examination, it is the policy of the department that a minimum of four tenured or tenure-track faculty members must participate in the oral defense of the project.
- ◆ **Project Submission:** Students must submit documentation of their project and demonstrate, describe, and defend their project in an oral presentation before their Project Examination Committee which shall constitute the comprehensive examination for their degree. The presentation will be open to all faculty and students. Documentation submitted for a Master's project must include a paper suitable for academic publication as, at minimum, a conference poster session. (Details of submission of research for academic publication is described on page 4 above.) The project must be presented and approved by the Committee and submitted **no later than fifteen days before the end of the term** (Comprehensive Examination, <http://catalog.iit.edu/graduate/academic-policies-procedures/examinations/>.) The graduate student must be registered in the semester in which the project is submitted.
- ◆ **Required Forms:**
 - ◇ **Masters Thesis, Project Review, or Exam Scheduling (Form G300)** Students must arrange their committee with their academic adviser by the end of the third week of classes in the term in which they will take the examination, and the **G300** Form with committee member names and the examination date must be submitted to the Graduate Office of Academic Affairs (GAA) no later than two weeks prior to the exam date. The *Masters Comprehensive/Ph.D. Qualifying Exam Results* form (**Form G303**) will be sent to the Department for completion as a result of submission of form **G300**, but the G303 form is never available to students. Form G303 will be completed and submitted by the department.

Doctor of Philosophy Students Examination and Research Policies

To be successful in the pursuit of their degree, doctoral students must read and become very familiar with all of the references cited below.

- ◆ **Graduate Academic Affairs: Dates and Deadlines:** Thesis dates and deadlines for the current term. This is a **must-read** for the term in which you will complete your thesis. <https://www.iit.edu/gaa/students/dates-and-deadlines>
- ◆ **Graduate Academic Affairs: Thesis Examination FAQs:** <https://www.iit.edu/gaa/students/faqs>
- ◆ **Graduate Catalog: Graduate Academic Policies and Procedures: Thesis:** <https://catalog.iit.edu/graduate/academic-policies-procedures/thesis/>
- ◆ **Graduate Studies Handbook: Examinations:** This includes information on Qualifying Examinations, Comprehensive Examinations, Thesis Oral Examinations and the required composition of the Examination Committees <https://catalog.iit.edu/grad-handbook/examinations/>
- ◆ **Graduate Studies Handbook: Adviser Relationship - Graduate Student-Faculty Adviser Relationship:** <https://catalog.iit.edu/grad-handbook/adviser-relationship/>

Qualifying Examination for Doctor of Philosophy Students

The purpose of the Qualifying Exam (QE) in ITM is to determine if a doctoral student is prepared to advance to candidacy, undertake independent research, and begin working on their dissertation. The Doctoral Qualifying Examination shall be administered by a Qualifying Examination Committee composed of a minimum of two tenured or tenure-track faculty members from the department. With the approval of the Vice Provost for Academic Affairs, a third voting member of the committee may be included, who may be a teaching faculty member in the department, a faculty member from another department in the university, or a person from outside the university which might include adjunct faculty members; the process for approval of this member is described in the **Graduate Studies Handbook: Examinations** at <https://catalog.iit.edu/grad-handbook/examinations/>. Additional details regarding the qualifying examination not included here are in this publication as well.

- ◆ The Doctoral Qualifying Examination Committee for each student will determine the nature and requirements of the examination, which may be written and/or oral, and must inform the student in writing as to what will be required of them. If the examination includes an oral portion, a minimum of four tenured or tenure-track faculty members must participate in the oral portion of the examination.
 - ◇ Ideally this examination will be taken at the end of the first year of Ph.D. studies.
 - ◇ A master's comprehensive examination (Masters Thesis or Project Review) completed in a Master of Science program at Illinois Tech may be applied as the Doctoral Qualifying Examination **if** a minimum of four tenured or tenure-track faculty members participated in the oral portion of the examination.
- ◆ **Required Forms:**
 - ◇ **Masters Thesis, Project Review, or Exam Scheduling (Form G300)** Students must arrange their committee with their academic adviser by the end of the third week of classes in the term in which they will take the examination, and the G300 Form with committee member names and the examination date must be submitted to the Graduate Office of Academic Affairs (GAA) no later than two weeks prior to the exam date. The *Masters Comprehensive/Ph.D. Qualifying Exam Results* form (**Form G303**) will be sent to the Department for completion as a result of submission of form G300, but the G303 form is never available to students. Form G303 will be completed and submitted by the department.

Comprehensive Examination for Doctor of Philosophy Students

The purpose of a doctoral comprehensive examination in ITM is to determine whether the student demonstrates the necessary research skills and academic progress to continue in the Ph.D. program. The Doctoral Comprehensive Examination shall be administered by a Comprehensive Examination Committee composed of a minimum of four faculty members. Two members must be tenured or tenure-track faculty members from the department. A third voting member of the committee may be an affiliate faculty member, which is a faculty member in the department but in a category other than tenured or tenure track, which could be emeritus professors; departed faculty; teaching, research, affiliate, practice, and clinical faculty. Affiliate faculty who serve on exam committees are expected to contribute significantly to the thesis and its evaluation. The fourth member must be tenured or tenure-track, from either Illinois Tech but outside the major or academic unit, or external to the university. The Vice Provost of Academic Affairs has final approval on external members. Additional details regarding the comprehensive examination not included here are found at <https://catalog.iit.edu/grad-handbook/examinations/>.

- ◆ The Doctoral Comprehensive Examination Committee for each student will determine the nature and requirements of the examination, which will include a written component and an oral examination, and must inform the student in writing as to what will be required of them. The proposal for the student's doctoral dissertation will be presented and defended as part of the comprehensive examination and may constitute the sole written component.
 - ◇ Ideally this examination will be taken at the end of the second year of Ph.D. studies but in no case can it be later than one year prior to the planned date of the thesis submission and defense.
- ◆ **Required Forms:**
 - ◇ **Comprehensive Exam Committee and Scheduling of the Exam (Form G301A):** Students must arrange their committee with their academic adviser by the end of the third week of classes in the term in which they will take the examination, and the G301A Form with committee member names and the examination date, which is the date of the oral examination, must be submitted to the Graduate Office of Academic Affairs (GAA) no later than two weeks prior to the exam date. The *Results of Ph.D. Examinations* form (**Form G309**) will be sent to the Department for completion as a result of submission of form G301A, but the G309 form is never available to students. Form G309 will be completed and submitted by the department.

Thesis Submission for Doctor of Philosophy Students

A mandatory thesis preparation discussion is held at the beginning of every semester to assist graduate students with the preparation of their theses. The exact date and time is emailed to all graduation applicants by the Office of Graduate Academic Affairs. (<http://catalog.iit.edu/graduate/academic-policies-procedures/thesis/>)

- ◆ **Thesis Examination:** Details for preparation and submission of your Illinois Tech thesis as well as the thesis examination process are on the **Thesis Examination** page at <https://www.iit.edu/gaa/thesis>. Every doctoral student should become very familiar with all of the content on this page.
- ◆ **Graduate Thesis Manual:** Detailed instructions about how to format your thesis for submission is found in the 2021 edition of this manual at <http://Catalog.iit.edu/graduate-thesis-manual/>. (PDF version at <http://itm.iit.edu/data/2021GraduateThesisManual.pdf>.)
- ◆ **Thesis Templates:** The Microsoft Word template for your Illinois Tech thesis is at <https://www.iit.edu/gaa/thesis/writing-thesis-using-ms-word>. The LaTeX template and information is at <https://www.iit.edu/gaa/thesis/latex-thesis>.
- ◆ **Required Forms:**
 - ◇ **Thesis or Dissertation Committee Scheduling of Final Oral Exam (Form G301B):** Students must arrange their committee with their academic adviser by the end of the third week of classes in the term in which they will take the examination, and the **G301B** Form with committee member names and the examination date must be submitted to the Graduate Office of Academic Affairs (GAA) no later than two weeks prior to the exam date. The *Results of Ph.D. Examinations* form (**Form G309**) will be sent to the Department for completion as a result of submission of form **G301B**, but the G309 form is never available to students. Form G309 will be completed and submitted by the department.
 - ◇ **Final Thesis Approval (Form G501)** This form is due at least nine days before the end of the semester, during the Fall and Spring terms, and five days before the end of the semester, for Session B Summer term.
- ◆ **Departmental Thesis Information**

Doctoral students should be meeting with their research adviser to discuss the thesis no later than the beginning of their third semester of doctoral studies. Each student will be assigned a research adviser based on their research areas of interest. The research adviser will normally also be the thesis adviser and must be a tenured or tenure-track member of the faculty. In the Department of Information Technology and Management this currently includes Professors **Omar, Dawson, Gopal, Rangarajan, and Zhang**. Each faculty member eligible to serve as a thesis adviser will have an ITM 691 section scheduled each term. Students will register for ITM 691 for terms in which they will conduct thesis research. Questions about departmental policies for student research and research adviser assignments should be directed to ITM Department Chair Professor **Gurram Gopal**, 312.567.3651 / Galvin Tower 15F3-2 / gopal@iit.edu.

 - ◇ **Research Faculty areas of interest:**
 - Associate Professor **Maurice Dawson**: Cybersecurity, Internet of Things, software assurance
 - Professor **Gurram Gopal**: Management, business, customer relationship management, data analytics and machine learning, e-commerce, IIOT, and supply chain optimization
 - Associate Professor **Marwan Omar**: Cybersecurity, Machine Learning in Cybersecurity, digital forensics, Natural Language Processing Robustness, Virtualization, Cloud Computing security
 - Assistant Professor **Ann Rangarajan**: Individual, organizational, societal, and cultural factors underlying complex socio-technical systems that impact technology management and applied computer science, as well as computer systems engineering, information systems (IS) innovation and diffusion, and socio-technical factors impacting technology implementations.
 - Associate Professor **Yong Zheng**: Recommender systems, artificial intelligence, behavior analytics, data mining and machine learning, Natural Language Processing, data management.
 - ◇ **Thesis Examiner Appointments:** An initial thesis appointment with the Thesis Examiner must occur no later than six weeks before the end of the term in which the thesis will be defended, but may occur earlier. At this meeting students will be expected to share with the Examiner preliminary pages; at least one chapter that has tables and/or figures, if applicable; the appendix, if applicable; and the bibliography.
You must meet with the Thesis Examiner at least three times before you upload your final thesis. This consists of two full document review meetings and a final review/instruction meeting. Please see the full details in the Thesis Examiner FAQ at <https://www.iit.edu/gaa/students/faqs>.
 - ◇ **Thesis Committee:** The Thesis Committee must have at least four members who are tenured or tenure-track faculty in the university. Three members must be drawn from Professors Dawson, Gurram, Omar, Rangarajan, and Zhang, and one member must be an Illinois Tech faculty member who is outside the student's major. Students may elect to have an additional committee member who may be a teaching faculty member in the department or a person from outside the university which might include adjunct faculty members.
 - ◇ **Thesis Defense:** Students must defend their thesis in an oral presentation before their Thesis Committee which shall constitute the final examination for their degree. The thesis defense will be open to the public. At least **two weeks prior** to the thesis defense, the completed thesis must be distributed to each committee member for review and comment. (<https://catalog.iit.edu/grad-handbook/thesis-examination/>.) The thesis must be defended and then approved by the Thesis Committee and must be submitted (with any required revisions) **no later than fifteen days before the end of the term** (Master's Thesis Examination, <https://catalog.iit.edu/graduate/academic-policies-procedures/examinations/>.) The graduate student must be registered in the semester in which the thesis is defended.