Specifications for Thesis Preparation
2005-2006

Massachusetts Institute of Technology
BRIEF CHECKLIST

(With page reference to appropriate material)

1. Is the thesis (including the title page) on the required paper?
   (page 13)

2. Has each copy of the thesis been collated? Are any pages missing? Are all pages numbered correctly in one sequence?
   (page 9)

3. Is the original signed title page included in the first copy?
   (page 10)

4. Is the author's full name on the title page of the thesis?
   (page 10)

5. Are the thesis supervisor and department head/committee chairman's names on the title page of the thesis, and the supervisor's name on the abstract?
   (pages 10 & 11)

6. Does the title on the thesis and the abstract agree with the title given to the registrar?
   (pages 10 & 11)

7. Does the title page carry the appropriate copyright notice and, for theses where the student owns the copyright, the appropriate copyright permission statement?
   (page 10)

8. Are the correct number of copies being submitted?
   (page 5)

9. For doctoral theses, has the form for UMI been completed, and has an extra copy of the title page and abstract been stapled to it?
   (pages 14-15)

10. Do you have permission to use previously published material?
    (page 7)
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GENERAL INFORMATION

INTRODUCTION

This guide has been prepared by the MIT Libraries, as prescribed by the Committee on Graduate School Programs, to assist students and faculty in the preparation of theses. The Institute is committed to the preservation of the student’s thesis because it is both a requirement for the MIT degree and a record of original research that contains information of continuing value.

The requirements in this guide apply to all theses and have been specified to facilitate the care and dissemination of the thesis and to assure the preservation of the archival paper copy. Individual departments may dictate more stringent requirements. Questions not answered in this guide should be referred to the appropriate department officer or to the Institute Archives and Special Collections (14N-118, 258-5568 or 253-5690).

WHAT HAPPENS TO THE THESIS?

The academic department delivers the required number of copies of the thesis to the Institute Archives and Special Collections. One copy is kept as part of the permanent archival collection, and the other is sent to the appropriate divisional library (or libraries, if extra copies are required), where it is available for circulation.

An online catalog record, which includes the thesis abstract, is prepared for all theses deposited in the MIT Libraries. This information appears in Barton, our online catalog, which is accessible to researchers at other institutions through the Internet, as well as in the OCLC (Online Computer Library Center) database, an international bibliographic system available to libraries and individuals throughout the world. Abstracts of theses submitted for the degrees of Doctor of Philosophy and Doctor of Science appear in both the printed version and the online version of Dissertation Abstracts International, published by ProQuest Information and Learning (formerly Bell & Howell/University Microfilms Inc.[UMI]).

As theses are processed in the Libraries, each thesis is scanned and the digital version is made available in MIT’s DSpace (http://libraries.mit.edu/mit-theses). Copies of theses may be obtained through the MIT Libraries’ Document Services (14-0551, 253-5668; docs@mit.edu; http://libraries.mit.edu/docs/). Theses may also be submitted electronically, in PDF format, but the electronic version is not considered to be the official copy. Procedures for electronic thesis submission are available on the Document Services web site (http://libraries.mit.edu/docs/about-theses/add-your-thesis.html).

SUBMISSION DATE

Degree candidates must submit the required copies of their theses to the appropriate office of the department or course in which they are registered on the dates specified in the Academic Calendar. The Academic Calendar may be found in the MIT Bulletin and at http://web.mit.edu/registrar/www/calendar.html. September, February, and June are the months in which degrees are awarded. Additional copies of the thesis may be required by the department.
WHAT IS SUBMITTED?

All theses should be turned in to the appropriate departmental office; the office will deliver the theses to the Archives within a month after the degree date. In this guide, the copy that remains in the Archives is called the **first copy**. Additional copies required for the divisional libraries (see following section) are referred to as the second and (possibly) third copies. The department may ask for copies in addition to those required for the Libraries. The student may, of course, keep personal copies.

Bachelor's Degree Theses

Not all departments send bachelor's theses to the Archives. If your department does, only one copy is required for the Archives. Please check the requirements of your department. Undergraduate students do not pay a library processing fee.

Graduate Degree Theses

1. **Number of copies**
   Normally, two copies are required for the Libraries: one for the Archives and a second for the appropriate divisional library. In the following cases a third copy is required:
   a. students submitting the same thesis to two Schools or Programs (e.g., Management and Engineering)
   b. students submitting a thesis for two degrees (e.g., S.M. and M.Eng)

2. **Doctoral theses only**: completed UMI form (see section below) with an additional copy of the title page and abstract stapled to it


Abstracts of all doctoral theses (Ph.D. and Sc.D.) will be submitted to UMI Dissertation Services for inclusion in their publication *Dissertation Abstracts International (DAI)*. Subsequently, the abstract will appear in *DAI*’s print, microform, and electronic media, which are disseminated and used by researchers throughout the world. *DAI* can be searched by author’s name, subject terms, and all words in the title and abstract. All MIT abstracts will contain a note stating that copies of the full thesis are available from the MIT Libraries' Document Services.

*Abstracts should be no longer than 350 words; longer abstracts will be edited by UMI. Please complete the UMI form on page 15 of this guide, staple it to a copy of your title page and abstract, and submit it with your thesis.*

SUBSTITUTIONS OR CHANGES AFTER SUBMISSION OF THESIS

If, after a thesis is submitted, pages must be substituted or other changes made, they must be approved. A thesis substitutions form (available in the Institute Archives), signed by the thesis advisor OR department chairman, must be submitted with the replacement pages. After the thesis has been bound, special permission for substitutions must be obtained from the Vice President for Research and Associate Provost or the Dean for Undergraduate Education.
FEES

Students receiving advanced degrees from MIT are required to pay a library processing fee: $105.00 for a doctoral thesis ($50 for scanning and processing and $55 for the UMI abstract fee) and $50.00 for all other advanced degree theses. Thesis charges will be added to student bills during the semester immediately preceding graduation. Although the charges may appear on student accounts early in the semester, they are not due until the thesis is submitted. Late fees will not be applied up to that point. Undergraduate students do not pay a processing fee.

BINDING

All copies must be submitted unbound between cardboard covers; the thesis and covers should be clipped or tied together, NOT stapled or punched. Recycled temporary covers and clips are available in a cabinet outside the Map Room in the Hayden Library basement and at the Institute Archives (14N-118). The front cover should be labeled with the following information: author's name, thesis title, course, month and year of graduation, and which copy it is (first, second, or third).

The MIT Libraries pay for the binding of theses retained in their collection. Personal copies may be bound in hard or soft cover at MIT CopyTech or at many commercial binderies in the Boston area.

COPYRIGHT

The Institute's policy concerning ownership of copyrights to theses is covered in Rules and Regulations of the Faculty, regulations 2.71-2.73 and MIT Policies and Procedures 13.1.3. The following are guidelines to assist the student in determining who holds ownership of the thesis copyright:

The Institute will hold ownership of the copyrights to theses if:

1. the thesis research is performed in whole or in part by the student with financial support in the form of wages, salary, stipend, or grant from funds administered by the Institute
   and/or

2. the thesis research is performed in whole or in part utilizing equipment or facilities provided to the Institute under conditions that impose copyright restrictions.

In general, students may retain ownership of thesis copyrights when the only form of support is from (1) teaching assistantships (the duties of which do not include research activities) and (2) NSF and NIH traineeships and fellowships (although the trainee or fellow may be required to grant certain publishing rights to NSF or NIH). Actual determination of a student's status is made by reference to the account from which the student receives support. Specific clarification on permission to copyright should be referred to the Technology Licensing Office (NE25-230, 253-6966).

When copyright ownership is held by the student, the student must, as condition of a degree award, grant royalty-free permission to the Institute to reproduce and publicly distribute copies of the thesis, and must place the following legend on the thesis title page: "The author hereby grants to MIT permission to reproduce and to distribute publicly paper and electronic copies of this thesis document in whole or in part in any medium now known
or hereafter created.” Any requests for permission to use portions of such theses must be made to the student authors.

When copyright is held by the Institute, the MIT Libraries grant permission to use portions of the thesis to third party authors on a case by case basis for use in such authors’ works, e.g., permission for use of single images or certain passages. Additionally, the student is authorized to post electronic versions of the student’s own thesis, in whole or in part, on the World Wide Web. Any further publication of the thesis in whole or in part shall be made only with the authorization of the Technology Licensing Office, in consultation with the head of the department or course in which the student was registered when the thesis was accepted.

Regardless of whether copyright is held by the student or the Institute, the MIT Libraries publish the thesis electronically and allow downloads for a nominal fee.

Students may request a waiver of Institute copyright by written application to the Institute's Technology Licensing Office (NE25-230, 253-6966), which shall be granted only if the retained rights of the student as described in this guide are inadequate for the student’s needs and if a license from the Institute to the student would also be inadequate. Any such waiver of the Institute’s copyright shall be subject to a royalty-free grant to the Institute from the student to publicly distribute copies of the thesis, in whole or in part. Additionally, the student must place the above-captioned legend on the thesis title page.

Implementation: How to Copyright a Thesis

Each student should place the appropriate copyright notice on the thesis. Copyright notice consists of four elements:

1. the symbol "c" with a circle around it © and/or the word "copyright,"
2. the year of publication (the year in which the degree is to be awarded),
3. the name of the copyright owner, and
4. the words "All rights reserved."

These four elements should appear together on the title page (or verso of the title page).

Examples:

a. student is copyright owner: © 2005 Jane Doe. All rights reserved.
b. Institute is copyright owner: © 2005 Massachusetts Institute of Technology. All rights reserved.

Sample title pages are included on pages 17-20. A copyright notice should also appear on all material in non-paper formats included with a thesis.

Use of Previously Published Material in a Thesis

Each student is responsible for obtaining any necessary permissions for including previously published material as part of the thesis. If, for example, a student has already published part of the thesis as a journal article and, as a condition of publication, has assigned title to the journal's publisher, the student has no further rights in the article. Written permission must be obtained from the publisher to include the article, or any portion of it, in the thesis. Similarly, permission must be obtained to include papers written while the student was employed by a commercial company or non-profit organization if title belongs to the company or organization.

A sample permission letter may be obtained from the Office of Intellectual Property Counsel (http://web.mit.edu/ipcounsel/publication.html).
If the student knows, prior to publication or employment, that such material will be included in a thesis, he or she may wish to retain title to the material or to reserve sufficient rights to use the material. Further information is available from the Office of Intellectual Property Counsel.

POLICY FOR TEMPORARY RESTRICTIONS ON THE DISTRIBUTION OF THESIS

Thesis research should be undertaken in light of MIT's policy of open research and the free interchange of information. **Written notification of patent holds and other restrictions must reach the Institute Archives before the thesis in question is received, as under normal circumstances all theses are open and available for public inspection once they have been received by the Archives.** When there is good reason for delaying the distribution of a thesis, the procedures below should be followed.

**Patent Claims**

When MIT holds the rights to any intellectual property contained in a thesis, students and their advisors must work with the MIT Technology Licensing Office ([http://web.mit.edu/tlo/www/](http://web.mit.edu/tlo/www/)) to determine if a patent application is to be filed. If so, the Licensing Office will notify the Institute Archives, and the thesis will be withheld from distribution for up to one year. If an extension is required, application must be made to the Vice President for Research and Associate Provost, who will inform the Archives if an extension is approved.

When a student holds the rights to any intellectual property contained in his or her thesis, application must be made to the Dean for Graduate Students for graduate theses or the Dean for Undergraduate Education for undergraduate theses for permission to withhold a thesis. If granted, the dean will inform the Archives, and the thesis will be withheld for a period of three months. If an extension is required, application must be made to the Vice President for Research and Associate Provost.

**Government Restrictions**

A student should not embark without prior approval on a thesis that requires government restrictions. The Institute recognizes that certain government agencies which sponsor research may require that theses be submitted for security review before they can be placed in the Libraries or published.


**Privacy and Security**

Occasionally, on completing a thesis, a student may feel that its distribution will jeopardize the privacy or safety of the author, other individuals, or companies. If the thesis cannot be rewritten to remove the problematic material, the author and supervisor should submit the thesis to the director of the program, who will prepare a recommendation for the Dean for Graduate Students for graduate theses or the Dean for Undergraduate Education for undergraduate theses, who will then consult with the Vice President for Research and Associate Provost. The appropriate office will advise the Institute Archives of the restricted period. In all cases the restricted period should be kept to a minimum.
PAGINATION

The title page is always considered to be page 1, and every page must be included in the count regardless of whether a number is physically printed on a page. The entire thesis (including title page, prefatory material, illustrations, and all text and appendices) must be paginated in one consecutive numbering sequence.

Theses should be prepared double-sided whenever possible. In a double-sided thesis, both sides of every page (starting with the title page and including any pages that have been left blank) must be accounted for in the numbering sequence. Therefore, in a double-sided thesis, odd-numbered pages are always on the right and even-numbered pages on the left. Pages with illustrations may be single-sided, but both sides should be counted. Single-sided theses should be numbered only on the front of every sheet.

When using thesis templates on Athena, use caution and verify that the pagination requirements are being met.

PREFATORY MATERIAL

Selecting a Title

Your work will be a valuable research tool for other scholars only if it can be located easily. Search engines use the words in the title, and sometimes other descriptive words, to locate works. Therefore,

1. be sure to select a title that is a meaningful description of the content of your manuscript; and
2. when possible, use word substitutes for formulas, symbols, superscripts, Greek letters, etc., which do not appear on most computer keyboards and would render your title unsearchable.

Examples:

"The Effects of Ion Implantation and Annealing on the Properties of Titanium Silicide [not TiSi₂] Films on Silicon Substrates"

"Radiative Decays of the J/Psi [not J/ψ] to Two Pseudoscalar Final States"
Use of the Regulated Secretory Pathway to Ease Protein Product Recovery in Animal Cell Culture

by

David M. Stevenson

B.S. Chemistry
Angelo State University, 1987

SUBMITTED TO THE DEPARTMENT OF CHEMICAL ENGINEERING IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN CHEMICAL ENGINEERING
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

FEBRUARY 1994

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Signature of Author: __________________________________________________________

Department of Chemical Engineering
January 14, 1994

Certified by: ____________________________

Gregory Stephanopoulos
Professor of Chemical Engineering
Thesis Supervisor

Accepted by: ____________________________

Robert E. Cohen
Professor of Chemical Engineering
Chairman, Committee for Graduate Students

Thesis title as submitted to registrar

Author's name as submitted to registrar

Previous degree information

Copy this phrase substituting degree, department and any specializations

Month and year degree will be granted (June, September, February ONLY)

Copyright statement

This permission legend MUST follow if copyright is owned by student (but not if owned by MIT - see page 18)

Author's department and the date thesis is to be presented to the department

Full name and title of advisor as it appears in the MIT catalog

The name and title of this person varies in different degree programs and may vary each term; contact the departmental thesis administrator for specific information
Abstract

Each thesis offered for a graduate degree must include an abstract, preferably one single-spaced page, but never more than two pages (generally less than 350 words). The abstract should be thought of as a brief descriptive summary rather than a lengthy introduction to the thesis. Doctoral abstracts are submitted to UMI Dissertation Services for publication in Dissertation Abstracts International (DAI); doctoral candidates should keep their abstracts under 350 words as longer abstracts will be edited by UMI. Databases such as DAI provide full-text searching of abstracts, so the presence of significant key words in a short abstract will facilitate access. The abstract should immediately follow the title page.

Use of the Regulated Secretory Pathway to Ease Protein Product Recovery in Animal Cell Culture

by

David M. Stevenson

Submitted to the Department of Chemical Engineering on January 15, 1994 in Partial Fulfillment of the Requirements for the Degree of Master of Science in Chemical Engineering

ABSTRACT

An experimental study was performed to determine methods to improve the cloning efficiency of the BTC3 cell line prior to obtaining clonal cell lines expressing recombinant protein. Polylysine pretreatment of the substrate was found to increase colony formation along with the use of conditioned media. Using the acquired knowledge, clonal lines were obtained from the parental (nonclonal) line, as well as from mixtures of cells expressing recombinant prolactin.

Secretion experiments were carried out on the clonal lines to determine whether the recombinant prolactin could be used in a controlled secretion production scheme. Results show the recombinant prolactin to be partially sorted to the regulatory secretory pathway, however the native insulin appeared to be preferentially sorted by the cells.

Thesis Supervisor: Gregory Stephanopoulos
Title: Professor of Chemical Engineering

Thesis title as submitted to registrar

Author’s name as submitted to registrar

Copy this phrase, substituting the department, the date the thesis will be submitted, and the degree to be received

Type the word ABSTRACT before the body of the text

Single-spaced summary; keep under 350 words

Full name and title of advisor as it appears in the MIT catalog
Biographical Note

Although not a requirement, it is recommended that each thesis contain a short biography of the candidate, including institutions attended and dates of attendance, degrees and honors, titles of publications, teaching and professional experience, and other matters that may be pertinent. This section may be single-spaced.

STYLE

The style of quotations, footnotes, and bibliographic references may be prescribed by your department. If your department does not prescribe a style or specify a style manual, choose one and be consistent.

NOTES AND BIBLIOGRAPHIC REFERENCES

Whenever possible, notes should be placed at the bottom of the appropriate page or in the body of the text. Notes should conform to the style appropriate to the discipline. If notes appear at the bottom of the page, they should be single-spaced and included within the specified margins (see section below).

It may be appropriate to place bibliographic references either at the end of the chapter in which they occur or at the end of the thesis.

APPENDICES

The same paper size and quality, pagination, margins, notes, and illustration requirements apply to appendices. They support the research in your thesis and should be as readable and reproducible as the rest of your work. Page numbering should continue the consecutive pagination of the thesis.

TYPEFACE AND SIZE

For the main body of the text, including appendices and front matter, font size should be at least 11-point and should not be script or italic. Italics may, however, be used for short quotations or to highlight variables in an equation, for example. Notes and the text in tables, etc., should not be smaller than 10-point.

MARGINS AND SPACING

Top, bottom, and both side margins must be at least an inch wide (1") to allow for binding and trimming. All information (text headings, notes, and illustrations), excluding page numbers, must be within the text area. Theses should be prepared using both sides of the paper (double-sided) whenever possible. Oversize sheets must be folded to come within the margins so the folds will not be trimmed off or bound in during the binding procedure.

The text of the thesis may be single- double- or one-and-a-half-spaced. The abstract, biography, notes, and bibliography should be single-spaced.

If you are writing your thesis on Athena, follow the formatting and typeface instructions under the LATEX or FRAME olc stock answer topics by typing the command "olc_answers" on any Athena workstation.
PRODUCTION

USING ATHENA

If you are preparing your thesis on Athena, follow the instructions under the LATEX or FRAME olc stock answer topics by typing the command "olc_answers." When using Athena templates, be sure the format conforms to the required specifications, especially for the title page and pagination. Final copies should be printed on the printer "Thesis" (11-004), which is stocked with acid-neutral Xerox Image Elite paper.

PAPER

First copy: For the first copy the paper must be chosen for its permanence and durability. This is the copy that should bear the original signatures. The paper MUST HAVE A WATERMARK that confirms that it is acid-neutral or acid-free. To find the manufacturer's watermark, hold the paper up to a light. The following 20-lb. watermarked acid-neutral papers are acceptable:

- Xerox Image Elite or Archival Bond (available at CopyTech, 11-004)
- Crane's Thesis Paper
- Hammermill bond (do not use recycled Hammermill)
- Strathmore Bond (do not use recycled Strathmore)

Second copy: While the acid-neutral papers are also suggested for the second copy, a bond paper containing 25% rag (cotton content) is acceptable.

The following are not acceptable for either copy: Recycled paper, MIT bond, erasable paper, or regular paper from photocopy machines. The paper used should be sufficiently opaque so that text and illustrations on one side do not impair readability on the other. If there are any questions about the acceptability of paper, contact the Institute Archives (258-5568 or 253-5690).

If you are preparing your thesis on Athena, print the final copies on the printer "Thesis," which is stocked with Xerox Image Elite paper.

The standard size for theses is 8½ by 11 inches (see section on oversize material, page 14).

DOUBLE-SIDED OR SINGLE-SIDED PRINTING

Double-sided printing is acceptable if the paper is sufficiently opaque so that text and illustrations on one side do not impair readability on the other side. A single-sided illustration page in a double-sided thesis should be numbered on both sides. When creating a double-sided copy, be sure that the page numbers are either in the center or on the outside edge.
OVERSIZED PAGES

Charts, graphs, tables, etc., should be reduced whenever possible to an 8½-by-11-inch format. If material is not reducible, oversize sheets must be folded to come within the margins so the folds will not be trimmed off or bound in during the binding procedure. Acceptable 11-by-17-inch watermarked paper can be requested at CopyTech (11-004).

GRAPHICS

Use of Color

Please note that the theses are scanned in black and white. It is recommended, therefore, that content identified by color in illustrations such as charts and diagrams also be conveyed in text or with black and white labels. Color content, active links, and searchable text will only be available in the online version of your thesis if you have given an electronic copy (PDF) to the MIT Libraries. See the Document Services web site (http://libraries.mit.edu/docs/about-theses/add-your-thesis.html) for more information.

Photographs

Photographs should be black and white whenever possible. Pages containing photographs should be numbered as regular pages. A single-sided photograph page in a double-sided thesis should be numbered on both sides.

All graphics must be within the margins.

NON-PAPER FORMATS

Digital or magnetic materials such as videos, CDs, and DVDs may accompany the written text of the thesis; one copy should accompany each copy of the thesis submitted. Students should recognize, however, that rapid changes in technology make these formats obsolete quickly. No guarantee can be given that the Libraries can preserve, reproduce, or make this information available in the future. Therefore, when feasible, the information that is in magnetic form should also be represented in the written text of the thesis.

Labels

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FORM FOR SUBMITTING ABSTRACTS OF DOCTORAL THESES TO UMI

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by

Regina Valluzzi

Submitted to the Department of Materials Science and Engineering in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science at the Massachusetts Institute of Technology

June 1989

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ABSTRACT

An experimental study was carried out on the performance of graphite brushes, both pure and composite materials containing 50% by weight of silver, sliding against noble metals (silver, gold, palladium, platinum, ruthenium, rhodium, rhenium and iridium). The current was 24.5 A (a current density of 500 A/in\(^2\)) and the sliding speed 12.8 ft/s. The test atmosphere was either wet CO\(_2\) or dry wintertime air. The tests were also done on copper and nickel for comparison. A pin-on-disc tester was used.

The results from the silver-graphite brush tests showed a positive correlation between wear and the compatibility of the noble metals against carbon, and a negative correlation between wear and friction. The passage of 24.5 A of current did not affect the wear rate in air but did affect the wear rate in wet CO\(_2\). In wet CO\(_2\), the wear rate increased as the current level was increased in the range of 0 to 50 A. More data was needed for the pure graphite tests.

Among the noble metals, palladium, platinum and rhodium showed the lowest brush wear rate. The brush wear rate for these metals was only half of that of copper.

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