The Masters of Engineering Thesis Guide: Course VI Thesis Policies and Procedures

Fall 1994

Massachusetts Institute of Technology
Department of Electrical Engineering and Computer Science
The Course VI Undergraduate Office, Room 38-476, (617) 253-7329

THESIS DEADLINES
[Discussion of Deadlines and Extensions on page 11]

Term	Degree Date	Deadline
Summer Session 1994	September 1994	August 26th, 1994
Fall Term 1994	February 1995	January 27, 1995
SPRING TERM 1995	JUNE 1995	FINAL DEADLINE: MAY 26, 1995 [Prize Nominations: May 5, 1995]

THESIS PROPOSALS are due on the last day of classes of the first term of registration for 6ThG, and no later than one term before graduation.

Contents

1 Introduction: What is the M.Eng. Thesis?

The thesis requirement gives students an opportunity to develop and demonstrate their ability to carry out and document a reasonably comprehensive project requiring considerable initiative, creative thought, and a good deal of individual responsibility. The thesis may be a design project, an analytical paper, or experimental work of a technical nature.

M.Eng. theses normally involve one or more of the following:

1. Design of a system followed by construction, test, and evaluation;
2. Formulation of an analytical or computational model of a system or process, simulation of the model, and comparison with actual data;
3. Development of a computer program that might:
   (a) simulate a real system (e.g. Artificial Intelligence);
   (b) aid in a diagnostic procedure;
   (c) provide sophisticated, real-time analysis of measured data;
   (d) develop and analyze a theory or theorem which is an abstraction or idealization of an actual process or system;
   (e) apply some of the standard methods (of communication theory or control theory, for example) to aid in understanding of a process or system.
4. Experimental study of physical phenomena.

The thesis will generally be completed in two terms in the time equivalent to one regular subject per term (24 units total). Ordinarily the thesis is an individual effort; however, group projects are possible if the work of the individuals can be evaluated separately. Separate thesis documents must be submitted.

The thesis is normally completed during the graduate year. While preparatory work may be begun while the student is an undergraduate (for pay or for credit as UROP, or under 6.100 or 6.199 for a grade), the actual thesis work should be done and registered for under 6ThG while the student is classified as a graduate student. Unless you are in the VI-A Program, you must do your research at M.I.T., not at a summer or part-time job for which you received pay. Students may use a thesis topic which suggested itself during their summer jobs, but they must have an M.I.T. supervisor.

2 Administration and Registration

The M.Eng. Thesis is administered by Anne Hunter, the Administrator of Course VI Undergraduate Programs. Questions about thesis policies and procedures should be addressed to her. The M.Eng. thesis requirement calls for exactly 24 units of 6ThG. Students normally register for 12 units per term. No matter how many units of 6ThG a student registers for over several terms, no more than 24 units of 6ThG credit will be awarded. 6ThG is not affected by the Add Date. It may be added or dropped up to the Drop Date, with an Add/Drop Card. However Anne Hunter's signature is required, not that of your supervisor. You may petition to add or drop thesis up to the last day of the term.

Students must be registered for thesis in the term in which they complete their thesis in order to receive a final grade. Students who fail to complete their theses on time must therefore register for at least one additional unit of thesis during the subsequent term. Graduate students cannot be on light load, where they pay by the unit. However there is a proration system where by students can pay a prorated amount of tuition if they finish their theses during the first few weeks of a term.

3 Off-Campus Theses

Thesis research is usually carried out in laboratories operated by M.I.T. and located on-campus. There are some exceptions to this general rule which do not require explicit approval:

- Students in the VI-A Internship or the Engineering Internship Program who are doing their theses at the company need only arrange for the Company Letters (see pps. 15 and 17) to be received with their proposals and final documents.
- Students doing thesis research at Lincoln Laboratory or at the Charles Stark Draper Laboratory need only arrange for the Company Letters (see pps. 15 and 17) to be received with their proposals and final documents.
- Students in the Joint Program with the Woods Hole Oceanographic Institution doing research there are also excepted.

All such theses must have a faculty or approved M.I.T. research staff supervisor as well as a supervisor as the off-campus location.

Students may request permission of the Department Professional Education Policy Committee (PEPC) to pursue thesis research off-campus locally. For such requests to be approved, the thesis research must require facilities not available at M.I.T., and the supervisor must agree to supervise the research actively.

If the off-campus location is a commercial or industrial location, there may be special problems of patents, copyrights and conflict of interest which must be addressed, particularly if the student receives compensation from the company. Unusual cases may be referred to the Dean of the Graduate School for decision.

4 Classification and Copyright

Faculty rules require that copies of all graduate theses shall be deposited in the Institute Library where they are available to the public.

Consequently no student is permitted to embark on a thesis project which might be classified by the government as `Confidential' or `Secret' for reasons of national security, or `Company Confidential' by a company for proprietary reasons. Theses done in classified areas of companies must be reviewed by the government to confirm that they are unclassified. A statement must be attached to the proposal when it is submitted indicating that in the best judgment of the student and the supervisor the thesis will be unclassified. A sample statement is attached. (See page 17.)

Since the student has done both the work and the actual writing of the thesis document, the assumption is that the student should own the copyright of the thesis document. In some cases where the student has received support for the work the thesis may be copyrighted to M.I.T.

5 VI-A Students

Those VI-A students who are admitted to the graduate program use their final six-month work assignment to do their thesis research. This is an M.Eng. thesis registered for as 6ThG and subject to M.Eng. thesis policies, not those for the S.M. or Ph.D. theses. VI-A students should find an M.I.T. supervisor before their graduate VI-A assignment, and deal with issues of corporate secrets before they begin work.

6 The Thesis Proposal

It is very important that the Thesis Proposal be started as soon as a supervisor has agreed to work with you on a thesis. Do NOT wait until the week before the deadline to start. Only when a proposal has been submitted to the Undergraduate Office do you officially have a thesis and a supervisor. Each student must submit a thesis proposal for Department approval before undertaking the major work of the thesis.

The proposal must be no more than about five pages plus references and must be accompanied by a cover sheet available in the Course VI Undergraduate Office. VI-A students must also submit a proposal accompanied by a company agreement letter. (See page 15.) Background information should demonstrate knowledge of previously-reported, related work in the literature. The proposal should be well-written and explain clearly the background and the purpose of the research and define the scope of the thesis clearly. Don't be dismayed if the course of the research seems impossible to predict in detail -- make the best preliminary estimate you can. It is assumed that your thesis project will evolve as it progresses; do not re-submit a proposal or inform the Undergraduate Office of evolutionary or title changes. However, if your supervisor or project changes completely, you should submit a new proposal. Once you have submitted this, NO other progress reports need be submitted to the Undergraduate Office at any time.

7 Thesis Grades: The Grade of J or the Grade of U

When you register for thesis for the first time, the Undergraduate Office must receive a proposal from you by the last day of classes for that term. If we receive a proposal, and you have registered for 6ThG, we will give you the grade of J (satisfactory progress) for 6ThG. If we do not receive a proposal by the deadline, you will receive the grade of U (Unsatisfactory progress).

The grade of U (Unsatisfactory progress) will also be given if the thesis supervisor informs the Undergraduate Office that he or she wishes to give a student that grade. The final grade in 6ThG is a letter grade, not Pass/Fail. No Incompletes (I's) will be given in thesis. A grade is solicited from a thesis supervisor by the Undergraduate Office ONLY at thesis completion. Unless a supervisor informs us otherwise, once the proposal is submitted, the grade of J will be given until thesis completion. For thesis registration, IAP is part of the Fall Term and no IAP thesis registration is necessary.

8 When to Start

You should start thinking about your thesis research project as early as possible. Be on the alert for interesting problems that come to your attention in class, personal contacts, or through the technical literature.

The best time to start defining a thesis project is during the senior undergraduate year. Undergraduates planning to continue for the M.Eng. should try to get involved in a research group (through UROP, initially) as early as the sophomore or junior year. It is particularly important for students interested in continuing for the Ph.D. to gain exposure and experience in research. (Being involved in a research group is one of the best ways to improve chances for funding as a Research Assistant for graduate school.) Some faculty feel that there is a long period of apprenticeship during which the student's training requires more effort than is returned by the student's labor. Only after this period does the `payback' begin. It is from that `payback' period that most supervisors expect to find the student's M.Eng. thesis work.

9 The First Step: Finding a Topic and Supervisor

It's not as difficult to find a thesis topic and a supervisor as many students think. For one thing, an M.Eng. thesis supervisor need not be a Course VI faculty member. Students thinking about continuing directly into the Ph.D. program will find it strongly to their advantage to establish an early research relationship with EECS labs and faculty. However, any School of Engineering or Science faculty member or most Department-affiliated senior research staff members may supervise an M.Eng. thesis. Use the Research Interest Guide to look for non-faculty supervisors. If you wish to be supervised by a faculty member outside the

School of Engineering or Science, or by a staff member not listed in the Research Interest Guide, you may request permission. Consult with Anne Hunter.

Find a project which is of direct and intense interest to you and which will give you a maximum opportunity not only to learn about the subject being investigated, but also about proper methods of technical investigation. If you are already a graduate student in the M.Eng. program, you will want to avoid projects so remote from your current training that acquiring the necessary background will cause excessive delay.

10 More Ways to Find a Thesis

Each student is totally responsible for finding a thesis topic and supervisor. While many people will be willing to help you, the final responsibility is yours alone.

If you aren't VI-A and haven't been involved in a research group where you can do your thesis, it still isn't impossible to find a thesis. If you already have a very specific topic in mind, you may have to talk to many faculty and staff to find one interested in supervising you, so start early.

- You may have done a project in a laboratory subject which you wish to extend, or you may have done well in a subject which needs a lab or lecture demo developed. If so, talk to the appropriate faculty or staff members.
- Network! Talk to your faculty advisor and any others you know for leads, and to develop and define your technical interest. Ask Ph.D. students to recommend faculty.
- Pick up a `Research Interest Guide' and a `Recent Undergraduate Thesis Projects' listing (No M.Eng. theses have been completed yet) in the Undergraduate Office and talk to faculty in areas that interest you.
- Attend the many colloquia and seminars held by research labs and the Department. Every Fall each Graduate Area has an Open House -- be sure to attend those that might interest you.
- Narrow your scope to one or two specific research areas, and see faculty and staff in those areas. Ask them what projects they need done, and who else might have suitable research available in the same area.
- Look at recent EECS theses in Barker. You will often find definite suggestions in such theses for additional work that needs to be done. If you get stuck, go back to your academic advisor and talk things out again, choosing a different field with new people to contact.
- Scan the technical journals.

As soon as you have reached a meeting of minds with a supervisor, start work on a thesis proposal to get your topic defined and formalized.

11 Working on the Thesis and Avoiding Delay

Many students fail to graduate on time because their theses are not complete. Some delays are inevitable, but there are ways to minimize them.

1. Unavailable Parts. Special parts which have to be ordered can cause delays of weeks or months. Try to find alternate sources, other ways of coping, and do legwork rather than passively waiting for parts to arrive. Do other aspects of the thesis if waiting is unavoidable.
2. Waiting for Other People to do Their Part. Ph.D. students and faculty can operate on a different time-scale than M.Eng. students. Next term can be almost as good as next week. Try to anticipate and work around these problems, avoiding projects that are excessively interwoven with theses that can't really be started until somebody else makes something work. Think flexibly about altering your project to avoid this, but NOT by enlarging it to include other people's projects! Bear in mind that some faculty are accustomed to extensive research S.M. theses, not the true 24-unit M.Eng. thesis projects.
3. The Incredible Expanding Thesis. Your project will evolve as you progress. But that should not mean that it gets bigger and more inclusive. Negotiate diplomatically.
4. The Alienated Supervisor. Students often think a supervisor has lost patience with the student and the project when it is nothing personal, just the press of other commitments. Don't react to this situation by disappearing. Keep working and keep your supervisor aware of your efforts and progress. They like to know what is going on, and they hate feeling that you've disappeared. Write notes or send electronic mail OFTEN.
5. Writing Delays. Students can be frustrated when they hand their supervisors a chapter or two of write-up, which it took them a few hours to write, and find that it takes the supervisor several days to read, correct and return it. Other students find it impossible to start writing. Don't wait until you are finished designing, programming, testing, debugging, etc., to start writing. Go to the Barker Engineering Library and read theses similar to yours for good ideas about presentation, tone, etc. Develop a detailed outline with lots of notes, a list of figures, a reasonable format (there's no single correct format), bibliography. Draft an introduction and first chapter. Listen carefully to your supervisor's suggestions for revision. Don't wait until it is 90% written to show it to your supervisor. Take at least the first chapter to the Writing Center for analysis and assistance.
6. Lack of Discipline and Time Management Skills. Working on a thesis may be different from anything you've done while at MIT; for four years you may have had nothing but short, specific and discrete tasks due at short-term intervals. With the thesis there is a final deadline, a year or more away. This requires a different kind of self-discipline. MAKE A SCHEDULE. Write out a detailed, ordered list of tasks that have to be done, allowing for the inevitable delays and other commitments, and aiming not for the final deadline, but for a week or so earlier.

Set specific short-term deadlines and be a hard taskmaster. If you find your hours, days and weeks melting away to no effect, take early action. The UAAO has material and programs available to help you with time management (see Study Skills Coordinator, 7-103, 3-6772). Note that many supervisors will expect a first draft of the thesis document well in advance of the deadline.

7. Use the Barker Engineering Library. Barker is eager to help thesis students at every stage of the thesis project. The library can help students to approach topics, to perform on-line searches, and to assist with indexes, abstracts, and citations. For information and assistance, contact Ms. Schildhauer, x3-6051.

8. Funding and Special Equipment. If you need special computer accounts or equipment for your thesis, ask your thesis supervisor. For thesis wordprocessing or minor computation, Athena accounts should be satisfactory. If your work is for a sponsored research project or an academic subject, there are funds which should pay for these. The use of Department laboratory kits is discouraged. Note that there is a machine shop for EECS students located in the basement of Building 38. It is available to you if your thesis is not part of a funded research project. See Mr. James Byrne in Room 38-017 for assistance. The Department has no funds available for general thesis support.

9. If You Just Can't Finish. If you're going to miss the deadline, not by hours or days, but by weeks or months, sit down with your supervisor and agree on what exactly has to be done. Get off the degree list, arrange for housing for extra time, and keep going. It is very difficult to complete a thesis long distance or while working. Students who are sure they have only a few weeks of work left end up graduating several terms later. A few walk away with only the thesis remaining, let that thesis get old and cold, and get their degrees years later, if at all. If you just can't do it, consider dropping back and at least getting your S.B. degree.

12 The Thesis Document and Finishing Up

The thesis write-up is considered a major part of the thesis project. The report should include a clear statement of the problem and why it is of interest or importance, a description of the history and background literature on the subject, a statement of the author's work and observations, a discussion of the author's findings in relation to those of predecessors, the author's conclusions and suggestions for further work. Extensive data, code, or mathematical derivations should be in appendices rather than in the body of the report. Specific bibliographic citations should be included whenever reference is made to documents or other communications. It must be well written, clearly organized, and contain no stylistic or grammatical errors. Supervisors are encouraged to require early drafts, to provide criticism of the writing as well as the technical content, to require re-writes, and to insist that the final document conform to the accepted standards of technical writing. The final grade should be based in part on the writing quality of the thesis. The Writing

Center (14N-317, x3-3090) offers free consultation and advice on any writing problem.

13 Other Documents: MIT's Specifications for Thesis Preparation, etc.

The Institute publishes a booklet (revised 1994), outlining detailed rules for theses. Be careful when using it to distinguish between the more stringent requirements for Ph.D. theses and those for the M.Eng. thesis. To access the booklet from Athena, type add library; library and select Thesis Specifications from the Services and Assistance menu. We also recommend the Handbook for Scientific and Technical Writing by Rob Adams McKean, available free in the Undergraduate Office.

14 Writing an Abstract

You must include an abstract, and it should contain your thesis title, your name, your thesis supervisor, the degree and the date (see the sample on page 19). Those students who found it difficult to get their thesis title short enough should have no difficulty writing an abstract. Start by writing out a full title, with all the adjectives and phrases you cut from the title. Describe your methods or procedures in a couple of sentences, and your conclusions or results in another sentence or two. It should be no longer than 150 words. It may be helpful to refer back to your Thesis Proposal.

15 Wordprocessors, Printers, and Paper

- Wordprocessing. Theses generally go through many draft versions, with minor and major revisions. Early on in your project you will have to choose a formatter for your thesis document. Supervisors don't like handwritten material at any stage. The most popular formatter is LaTeX, though many students use Framemaker, Word, EZ, etc. To access the thesis templates on Athena, type attach thesis and look in /mit/thesis/tex/, /mit/thesis/frame/, etc. Copy the files into your thesis directory and follow the instructions in the README files. Be sure to specify the Course VI option, e.g. \documentstyle[11pt,tgrind,vi]{mitthesis}. Check to be sure that your title page is exactly like the one on page 18. Please note that information on the thesis templates on Athena may NOT be correct, especially for the title page. DO BACKUPS! No extensions can be given for computer, printer, or disk crashes.
- Printers. There are lots of printers around MIT that produce excellent copy, and Athena has a dedicated thesis printer. Theses should be prepared double-sided whenever possible.
- Paper. The two original copies that you submit must be on acid-free or 100% cotton or rag paper. [Acid-free paper is indicated by an ``∞''

watermark.] Athena's thesis printer is stocked with this kind of paper. Otherwise, obtain water-marked acid-free paper at University Stationery on Mass. Ave. (It's much cheaper there than at the Coop), and put it in the printer for the final few copies. Your thesis will only remain readable for a handful of years if it's on regular paper.

- Type. Fontsize should be between 10- and 12-point, and the bulk of the paper should not be singlespaced, although peripheral parts like the abstract, title page, acknowledgements, and appendices should be singlespaced. All print must be dark black (not grey).
- Margins. There must be at least one-inch (1'') margins on the top and bottom. The side margins must both be one and one quarter inches (1.25''). All text, charts, photographs, and code must fit INSIDE the margins. This includes appendices of code (try using a copier to reduce material to make it fit). Lack of control over your formatter (Latex, Frame, etc.) is NOT an excuse for failure to adhere to these rules. Get assistance from on-line consultants, friends, or SIPB! For pages of code, remember that there are good photocopiers available that will reduce your code so that it fits within the margins.
- Format. While no specific format is required, it is important to structure your paper clearly and logically.
- Corrections. Avoid the use of correction fluid; hand-scribbled corrections are never permitted.
- Figures. Charts, tables, and graphs should be capable of being photocopied clearly, and should not be hand-labeled. No material should be taped or glued to pages. Instead use a high quality printer to copy pictures into your text.
- Supplementary Media. You may submit floppies, video cassettes, etc., with your thesis, but the written part must make sense by itself.

16 Title Page and Copyright

Make your title page look EXACTLY like the sample one on page 18 of this guide. Use the name "Frederic R. Morgenthaler" for the third signature, precisely as shown. Check that his title is as shown, as Athena templates are incorrect at this time. If you own the copyright, copyright your thesis by placing a copyright notice on the title page, with your name and the year, as shown on the sample on page 18. The author must, as a condition of the degree, grant nonexclusive permission to the Institute to reproduce and distribute publicly copies of the thesis. A statement to this effect must appear on the title page. (See the sample title page on page 18.) You must submit a correct title page. If M.I.T. holds the copyright, grant it to M.I.T. and omit the permissions sentence.

You automatically have the copyright unless you received money from MIT for doing the research or writing it up, or if the work used equipment or facilities provided to the Institute under conditions that impose copyright restrictions. If you wish to register your copyright (certainly a good idea if you're planning to use your thesis for commerical purposes), contact the Technology Licensing Office at E32-300, 253-6966, for assistance. If it is not clear who should hold the copyright, seek assistance from the Intellectual Property Office (10-256, 253-1606).

17 Deadlines and Extensions

The deadlines for 1994-1995 are listed on the front page of this document. Note that the Department's final thesis deadlines are much LATER than the Institute's deadlines. Going past the Institute's Deadline to the Department's Deadline is NOT considered an extension and does NOT require any permission. Apart from eligibility for Thesis Prizes, the Institute Deadline means nothing to Course VI students. Do NOT call us to check the deadline: Trust us!

Here's Why: The Department Deadline is later than the Institute one because the Institute allows ten days after its deadline for supervisors to read and grade theses. We know from experience that by the time they are ready to sign theses, supervisors know the grades. Therefore our deadline for theses is also the deadline for final grades to be submitted to the Undergraduate Office. Students must bring the completed grade sheet (available from the Course VI Undergraduate Office) with the final copy of the thesis.

The Department's thesis deadline means that students who hand in theses after that date are not guaranteed that their final thesis grade will be posted in time for them to graduate that term. Students who hand in a thesis late may be able to graduate at Commencement but not have their names in the Commencement Booklet. Students who fail to graduate because their thesis wasn't finished will have to register for one unit of thesis for the following term, get on that term's degree list, and graduate at the end of it. No extensions of that guarantee beyond the final Department Deadline (as listed on the front of this guide) are possible. No thesis supervisor is empowered to extend the deadline. Since there are no extensions, there are no forms to be filled out to get an extension. Students should NOT give up at the deadline, but should hand in their theses as fast as possible. You may hand in your thesis on any weekday during business hours, at any time of the year. Students who miss the deadline but are very close to finishing should email Anne Hunter (anneh@mit.edu) on the morning AFTER the Final Thesis Deadline, so we can reassure you and encourage you to keep working, knowing we're pulling for you. Please eliminate other calls to the Undergraduate Office to inquire about extensions, especially ON or BEFORE the deadline. We save all of our strength and sympathy for those who actually miss the deadline, so that we just don't want to deal with people futilely trying to get extensions.

18 Supervisor's Signature and Final Grade

Try not to wait until the afternoon of the deadline to submit your thesis. Make sure that your supervisor will be here when you need his or her signature; no thesis can be accepted without a supervisor's original signature on the title page. The Department signature (Frederic R. Morgenthaler) will be furnished automatically later. Be sure to pick up a receipt/grade sheet from the Undergraduate Office before you hand in your thesis. Have your supervisor fill out the grade sheet part at the same time that he or she signs your thesis. Remember that your final thesis grade must be handed in with your thesis. In emergencies we will accept phoned-in or emailed grades from supervisors as long as the white grade sheet is sent promptly.

19 Copies, Labels and Binder Clips

Submit only two (2) copies of your thesis. They must both be on archival bond paper. The title page (see sample on page 18) must bear your and your thesis supervisor's original signatures. The Departmental signature will be provided later. It is customary to give your thesis supervisor at least one copy when you finish.

The copies must be submitted in temporary binders consisting of two pieces of cardboard and binder clips. These are available free in a cabinet outside the Binding and Repair Section of the Libraries (14N-0513). Do not hole-punch or bind your thesis in any other way since that would interfere with subsequent photocopying and microfilming. On the front cover of each binder, place a label containing your name, thesis title, degree name, ``Course VI,'' month and year of graduation, and supervisor's name.

20 The Library Processing Fee, Thesis Receipt/Grade Sheet and the Degree List

Masters students are required to pay a fee of $27.00 to pay for the microfilming of the thesis. Payment is made to the Cashier's Office (10-180), and the receipt of payment must accompany the thesis when it is submitted to the Department.

Before you come to the Course VI Undergraduate Office to submit your thesis, use the checklist on page 20 to be sure you're ready. You must bring the fee receipt and the grade sheet/thesis receipt form with you when you hand in your thesis. Do not trust anyone else to hand carry the white grade sheet copy or let it be sent in the Institute mail.

At that time your name will be checked against the Degree List. [If you intend to graduate in that term and you're not on that list (which is maintained by the Registrar) you will be sent to Mr. Dan Engelhardt (E19-335, x8-6434), to remedy the situation.] If you've followed these instructions successfully, your thesis will be accepted, and each copy of your thesis receipt/grade sheet will be stamped with an official Department stamp. Keep your receipt; it is your evidence that you did turn in a thesis. Take the stamped pink copy to your academic advisor, and check your degree requirements one last time.

21 Thesis Prizes

The thesis supervisors nominate theses for thesis awards. In the spring term the thesis must be submitted to the Undergraduate Office by the Institute Deadline (May 5, 1995) to be considered for a prize. The supervisor nominates by sending an additional copy of the thesis, with a nominating letter detailing how the thesis is superior, to Prof. James K. Roberge (for theses in Electrical Engineering) or to Prof. Rodney A. Brooks (for Computer Science theses). Nominations must be received by the Spring Institute thesis deadline. Theses which were submitted earlier, for the previous May, September and February degree dates, may be considered for prizes in the following spring. Questions from supervisors (not students) about prizes should be referred to the appropriate faculty member.

22 MasterWorks: The Oral Presentation

The Department will have a special Thesis Presentation Event, called MasterWorks, where M.Eng. students will make presentations of their research to interested Department faculty, students, and guests. We will be in touch with all M.Eng. students at the proper time. Prizes will be given for the best presentations.

If for any reason participation in MasterWorks is not possible, students are still required to make an oral presentation of their thesis project. This valuable part of your thesis generally consists of a twenty-minute presentation with a five-minute discussion period with the supervisor and at least one other faculty or staff member. Your supervisor will arrange your presentation. VI-A students completing thesis research at work usually arrange the oral presentation with their company supervisor, even if the final document is not completed there.

Supervisors are responsible for arranging oral presentations. While this presentation is not a `thesis defense', the supervisor may include the quality of the thesis presentation when assigning the final grade.

23 Hints for Oral Presentations:

1. Practice in front of friends, supervisor, and mirror. Practicing gives smoothness and polish. Do at least one complete `dry run' for timing.
2. Keep it short. Budget your time. Put your watch where you can see it, and stay aware of the time. Don't rush by talking fast. If you're running long, go straight to your conclusions, and omit detail.
3. Don't read, but use notes or an outline. Speak clearly and more slowly than seems reasonable. Make eye contact.
4. Be extremely organized and use a logical structure. Avoid getting bogged down in excessive detail. Give the Big Picture quickly, but mostly talk about your thesis project, not the total research project.

Consult your supervisor for advice about which parts to cover in more detail. Here is a possible structure:

Time	Topic
2 minutes	Introduction: [Background, Motivation, Big Picture]
1.0 minutes	Statement of Objectives, the Problem, the Hypothesis
3 minutes	Overview: Approach, Methodology
10 minutes	Most Important Thing: More Detail Here [example, substantive accomplishments]
2 minutes	Results
2 minutes	Conclusion: key lessons, need for future research

Note that you spend almost half of your time introducing or concluding.

5. Use a few (<10) professional-looking transparencies. Overhead projectors should be reserved in advance from the Instrument Room, 38-501, 3-4675. You don't have TIME to use the blackboard. Don't clutter up transparencies with many equations; keep them simple. Use figures, diagrams and pictures.

6. It's better to be too formal than too casual. Dressing up and speaking properly may help cover lack of sleep and nervousness. This doesn't mean your speech has to be humorless or lifeless.

7. Your target audience is neither your supervisor nor a freshman, but your fellow M.Eng. students in Electrical Engineering or Computer Science, as well as other interested faculty and staff.

A Sample VI–A/EIP Proposal Agreement Letter

Professor F. R. Morgenthaler
Department of Electrical Engineering and Computer Science
Room 38–476, M.I.T.
Cambridge, MA 02139

Subject: Master of Engineering Thesis of [Student]
Dear Professor Morgenthaler:

The attached Thesis Proposal Form entitled [Thesis Title] describes a research study that [Student] carried out as an MIT VI–Aor EIP student using, at least in part, the facilities of [Company]. [Student] intends to prepare a thesis based on this VI–A assignment to be submitted as one of the requirements for the Masters of Engineering degree. We understand that, if such a report is to be acceptable to MIT, faculty regulations require that:

1. The written presentation of the work must be approved by a member of the MIT staff who can have full access (during the course of study and in confidence) to the pertinent background, methods of investigation and results.
2. Research studies and thesis topics involving subject matter (including data, results, or methods) subject to restriction for reasons of either proprietary interest or national security are unacceptable as the basis for a thesis.
3. The actual thesis document becomes the permanent property of MIT, and will be placed in the MIT Library within one month of the date of submission.
4. For the thesis to be accepted, [Student], as copyright owner must give MIT the right to reproduce and to distribute publicly the thesis. If the student has assigned the copyright to [Company], [Company] agrees that MIT shall have the nonexclusive right to reproduce, publish and distribute the thesis.

We believe the proposed research can be carried out and an acceptable thesis prepared under these conditions.

We understand that the thesis will not be accepted by MIT unless accompanied by a letter from an authorized official of (company) confirming that the thesis is within the approved scope, and does not contain details objectionable to (company). A copy of the thesis will be submitted by (student) to (company) sufficiently in advance of the date of submission to permit review.

We also understand that except as noted above, and provided that (student) is not associated with any government or other sponsored project at M.I.T. in the field of the research study and does not make significant use of M.I.T. funds or facilities, all rights in the results of the research including any inventions or software developed by (student) in the course of this research study and thesis preparation, belong either to (student) or (company) as his or her assignee.

Direct Company Supervisor	Authorized Company Official	Student

B General Thesis Release Letter and Classification Review Letter

Professor F. R. Morgenthaler
Department of Electrical Engineering and Computer Science
Room 38-476, M.I.T.
Cambridge, MA 02139

Subject: Master of Engineering Thesis of [Student]
Dear Professor Morgenthaler:

I have reviewed the attached thesis of (student) on behalf of (company). The thesis is within the scope of the thesis proposal as previously approved and does not contain any material that is objectionable to (company). It is also approved for its technical content.

It is understood that the actual thesis document will be the permanent property of M.I.T. and will be placed in the M.I.T. Library within one month after the date of submission. (Company) agrees that M.I.T. shall have the nonexclusive right to reproduce, publish, and distribute the thesis.

Authorized Official of Company..

Professor F. R. Morgenthaler
Department of Electrical Engineering and Computer Science
Room 38-476, M.I.T.
Cambridge, MA 02139

Subject: Master of Engineering Thesis of [Student]
Dear Professor Morgenthaler:

I have reviewed the attached thesis of (student) on behalf of (company). The thesis is within the scope of the thesis proposal as previously approved and does not contain any material that is objectionable to (company). It is also approved for its technical content.

It is understood that the actual thesis document will be the permanent property of M.I.T. and will be placed in the M.I.T. Library within one month after the date of submission. However, the thesis will not be given general circulation until a review by the Office of the Secretary of Defense has been completed and the thesis released by the sponsor for general use. I will inform the Department of the results of such review as soon as possible. (Company) agrees that M.I.T. shall have the nonexclusive right to reproduce, publish, and distribute the thesis.

Authorized Official of Company..

C Sample Title Page

Free-standing 100nm Period Gratings Produced by
Achromatic Holographic Lithography

by

John C. Doe

Submitted to the Department of Electrical Engineering and
Computer Science
in partial fulfillment of the requirements for the degrees of

Master of Engineering in Electrical Engineering and Computer
Science

and

Bachelor of Science in Electrical Science and Engineering

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 1995

Signature of Author...
Department of Electrical Engineering and Computer Science
April 17, 1995

Certified by...
Henry I. Smith
Joseph F. and Nancy P. Keithley Professor of Electrical
Engineering
Thesis Supervisor

Accepted by...
Frederic R. Morgenthaler
Chairman, Department Committee on Graduate Theses

D Sample Abstract

A Stratigraphic Model Editor
by
Stephen P. Gildea

Submitted to the Department of Electrical Engineering and Computer Science
on May 16, 1992, in partial fulfillment of the
requirements for the degrees of
Master of Engineering in Electrical Engineering and Computer Science
and
Bachelor of Science in Electrical Science and Engineering

Abstract

The stratigraphic model editor provides a convenient and efficient tool for geophysicists manipulating the complex models used in ray tracing and other forward modeling techniques. The editor allows the user to build a model of the earth on a Symbolics Lisp Machine screen using the mouse. The earth models manipulated by the program represent a two-dimensional slice of the earth, typically extending three or four miles down and having 10 to 50 layers. The layers need not be flat, but can contain features such as reefs and salt domes. These models are important in exploration geophysics. The editor generates data files representing this model that can be used as input to a ray-tracing program. The description of the file format is written in a high-level declarative language, so that the editor can be easily modified to support other formats.

Thesis Supervisor: Roger Turpening
Title: Associate Director, MIT Earth Resources Laboratory

E Checklist for Handing in a Thesis

Read over this checklist before you hand your thesis in at the Undergraduate Office!

- Are your margins at least one inch on all sides and one and one quarter inches on the sides? Theses should be submitted double-sided whenever possible. If your thesis is double-sided it must be double-sided throughout the document, including the prefatory pages. Odd-numbered pages on the right, even-numbered pages on the left.
- Does your title page look exactly like the sample on page 18? Check the copyright and the sentence right after it that starts ``The author hereby...''.
- Include only ONE copy of the title page and abstract with each copy. The abstract must look a lot like the one on page 19.
- Check that all of your pages are included, in the right order. It's easy and extremely common to miss a few pages deep in the middle of the document. Count all the way through it. Make sure that there is only one continuous sequence with the title page counting as page 1 (the only page where the page number is unprinted). This includes the abstract, all appendices, etc.
- Make sure you have printed your final copies on watermarked acid-free paper. The athena printer `thesis' (located in the consultants' office by the Fishbowl) is always stocked with this paper.
- Have you made all the copies you need (for your mother, supervisor, friends)? Once your two original copies are submitted, you can't borrow them back.
- Are your two submission copies properly sandwiched in cardboard, held together only with binder clips, with the front covers clearly labeled? [See page 12]
- Have you paid your $27.00 processing fee at the Cashier's Office (10-180), and kept your receipt? [See page 12]
- For VI-A students and others doing off-campus theses: do you have your company letter? [See page 17]
- Have you and your supervisor signed the title page of both submission copies? The third signature (Prof. Morgenthaler's) will be provided later. [See page 18]
- Have you and your supervisor filled out your thesis grade sheet/receipt form? (Available in the Course VI Undergraduate Office) [See page 12]