

Doctoral Degree Requirements

The Institute specifies that a doctoral degree comprises creditable completion of an approved program of advanced study and a General Examination, in addition to a research dissertation of high quality based on original research. Also, the purpose of the doctorate is to develop in the individual the ability, confidence, and originality to grasp and solve major problems involving materials.

A. Departmental Doctoral Academic Programs

The Department of Biological Engineering offers a doctoral degree (PhD) in Biological Engineering with thesis field specified in the specific areas where the student has passed the required General Examinations, has satisfied the Academic Program elective subjects, has satisfied the thesis related subjects, and has completed a doctoral thesis. The choice of a Ph.D. or Sc.D. degree designation is left up to the student; the requirements are identical for both degrees.

B. Doctoral Subject Core A two-subject core is required of all doctoral students:

Required Core: Two Subjects

20.420 Biomolecular Kinetics & Cellular
Dynamics

20.440 Analysis of Biological Networks

It is assumed that incoming students have the undergraduate background necessary to tackle the core subjects. Students deficient in background may wish to take appropriate undergraduate subjects concurrently with the two core subjects in the first two semesters (Also see the Biochemistry and Cell Biology prerequisite requirement information below). If you are in doubt about your preparation for the core subjects, consult your academic advisor.

C. Advanced Subject Requirements beyond the Core

In addition to the core subjects, students are expected to take several restricted electives designed to add breadth and depth in the biological sciences and engineering. The goal is to find MIT subjects that best fit a



student's thesis research project and career objectives. Advanced subjects other than those enumerated in the lists below are acceptable upon approval by advisor and Course XX Graduate Program Chair. Please note: an elective subject is a 9-12 unit subject, if a subject is 6 units, students must take an ADDITIONAL 6-unit subject in order to count towards a 12-unit elective. Elective subjects must be letter graded; no P/D/F subject will be accepted as part of the program requirements.

Academic Program Restricted Electives

To enhance depth and breadth, the core subjects are supplemented by electives in science and /or engineering. The student in consultation with the advisor chooses four elective subjects. Elective subjects in four categories are acceptable upon approval by advisor and, for the subjects not listed here, the BE Graduate Program Chair:

1- Biological Engineering Restricted — one subject

To provide breadth in biological engineering, at least one graduate-level course beyond the Core Classes must be selected from the following group:

- 20.201 Mechanisms of Drug Actions
- 20.405 Principles of Synthetic Biology
- 20.410 Molecular/Cell Tissue Biomechanics
- 20.415 Physical Biology
- 20.430 Fields, Forces, and Flows in Biological Systems
- 20.450 Molecular and Cellular Pathophysiology
- 20.463 Biomaterials Science and Engineering
- 20.490 Computational & Systems Biology

2- Biological Engineering Unrestricted Elective — one subject

One graduate level Course 20 subject

3- Engineering/Science — one subject

To provide breadth in engineering or science, at least one graduate-level subject approved by the BE Graduate Committee Chair or Co-Chair must be selected.

4- Science & Biological Science — one graduate level Course 7 subject

To provide a firm foundation in modern biology, the student will be expected to have biochemistry and cell biology as prerequisites and then select one graduate-level subjects in biological science. If biochemistry and/or cell



biology have not been previously taken, it/they must be taken as remedial undergraduate subjects (7.05 or 5.07 for biochemistry, 7.06 for cell biology) before taking the graduate-level subject.

D. Grading Policy on Subjects Taken to Satisfy Departmental Requirements

Graduate Students are generally expected to receive a grade of “B” or higher in any subject taken to satisfy a Departmental Requirement, grades below “B” are normally considered to be unacceptable as a measure of progress towards degree objectives. Departmental requirements include:

- Two Core Subjects: 20.420, 20.440
- BE Restricted Elective: 20.201, 20.405, 20.410, 20.415, 20.430, 20.450, 20.463, 20.490
- BE Unrestricted Elective: Any Course XX subject
- Engineering/Science Elective
- Science & Biology Elective

E. General Examination for the Doctorate

The Institute mandates that general written and oral examinations be set for doctoral students. The student must pass both written and oral examinations to become a Candidate for the doctoral degree. Either part, once passed, need not be retaken (unless other arrangements are made per Graduate Committee recommendation).

General Written Examination

The Department sets a General Written Examination offered in the end of spring semester of the first year, based on the two-subject graduate core material. The Graduate Program Committee, constructs this examination, arranges for its grading and adjudicating of the students’ performances. Students must sit for this examination after the first two semesters in residence.

The examination is given in one day (2 questions, each two hours long, open book and notes). Questions focus on material from each of the core subjects. The purpose of the exam is to assess how well students can integrate and apply the fundamental tools and approaches laid out in the core curriculum. Mastery of the material in the core subjects is an important part of this, and students’ grades in those courses provide one measure of their



accomplishments to date. Equally important is that students are able to go beyond the compartmentalized nature of the material in those courses, and solve problems that cross the various subject boundaries. Copies of previous Written Examinations are available in the First Year Office Room 26-007 as well as the Academic Office, Room 16-267.

In considering the students' successful completion of the written exam, the Graduate Program Committee considers as an integrated whole the student's performance in the core subjects, other subjects, and the student's progress in pursuing a research program, along with his/her performance on the exam itself. If the Committee deems a student as having successfully satisfied all of the above as an integrated whole, she/he becomes a Qualified Doctoral Registrant and is eligible to sit for the Oral Examination in the second year. The Graduate Program Committee Chair will notify students and their advisors of the results of the Written Exam. Occasionally, students whose performance on the exam, while passing overall, is highly deficient in one area or another may be given a Conditional Pass. The student must then successfully accomplish additional work specified by the Committee in order to make up the deficiency and be allowed to proceed further.

General Oral Examination

The formal presentation of the Thesis Proposal will serve as the Oral Examination. The purpose of the Oral Exam is to test the student's ability to explain their thesis project, defend their scientific rationale, and propose alternate approaches, as necessary. The nature of the proposal may vary, depending on the project, but it should provide motivation as well as describe and justify the envisioned approach along with summarizing progress made to date. Preliminary results supporting the proposed research are beneficial, but not required, for the Thesis Proposal or the Oral Exam.

The Thesis Proposal/Oral Exam must take place by December 1 of the 3rd year, with the specific date scheduled before the beginning of the Fall Semester of the third year. If the student and advisor are convinced that a delay would serve the student's interests better, they must petition the Graduate Committee by August 1st of the summer following the 2nd year with their reasoning along with their commitment for a target date; the Graduate Committee will approve or deny the petition request. Failure to complete the Thesis Proposal/Oral Exam according to this policy will constitute unsatisfactory progress with respect to subsequent enrollment

and funding support. Under these circumstances the student will not be able to register for the spring semester of their 3rd year.



The student is responsible for arranging the Thesis Proposal/Oral Exam meeting with the Thesis Committee Members and for reserving the location (plan for the meeting to take two hours). Generally, this meeting should be arranged at least two months in advance because it may be difficult to find a mutually agreeable time for all involved. Once this meeting has been scheduled, the Thesis Committee members and the Academic Office must be notified by e-mail about the day, time, and location of the presentation. The Thesis Committee constituted for the Oral Exam may change over the course of the student's research, as determined by the student and advisor with approval by the Graduate Program Chair. Beyond administration of the Oral Exam, the Thesis Committee is meant to provide guidance on the various aspects of the student's project; Thesis Committee members should therefore be selected with this goal in mind.

The student should be sure to register for **Thesis Proposal (20.951)** for 0-24-0 credit units during the term in which the Proposal is defended.

At least one week prior to the Thesis Proposal presentation, the student should deliver a copy of the Thesis Proposal to each of the Oral Exam Committee Members and to the Academic Office.

The student should prepare a 30-minute presentation. The Oral Exam Committee members will have read and thought about the Proposal ahead of time. Given that the meeting lasts up to two hours, there will be ample time for questions/discussion during your presentation. If questions arise about the format or style of the presentation, the student should contact the Oral Exam Committee Chair. BE's oral examination is focused on subject matter in the proposal and related to the proposal. It is not intended as a general examination on biology.

The day of the presentation, the student should give the thesis chair an "Oral Examination for the Doctoral Degree" form. The Committee Chair must complete this form to confirm the outcome of a Thesis Proposal/Oral Exam Presentation. The completed form should be submitted along with any comments or recommendations made by the Thesis Committee to the Academic Office. From there, copies will be distributed to the student, the advisor, and the Committee Chair.



If the proposal as presented is acceptable, a Pass grade will be recorded for 20.951, the student changes status from a graduate student to a PhD candidate, and the student is expected to begin a schedule of regular meetings with their thesis committee.

If the proposal requires changes or improvements to be considered acceptable, a Pass grade will be recorded and the student will advance to PhD candidacy but the student will be expected to improve the proposal according to the committee's specifications before their next meeting.

If the proposal is unacceptable, the student will not be admitted to PhD candidacy. The student may either leave the program or complete a Master's thesis. A student that completes a Master's may apply for reinstatement into the PhD program or graduate with a Master's degree.

Each committee is free to choose its own criteria by which to judge the quality of thesis proposal. These criteria tend to include:

- a proposal document that conforms to the BE Handbook's guidelines,
- a feasible research plan proposed and defended by the student that will result in a body of work that will meet the committee's criteria for graduation, and
- scholarship in the research field demonstrating that the student is capable of executing original, informed research in that field.

F. Minor Requirement for the Doctorate

Philosophy of the Minor Requirement

There is no Institute requirement of a minor for the doctoral degree. At this time the BE Department does not have an official minor requirement. A student interested in pursuing a minor along with the doctoral degree must discuss with and gain approval of their research supervisor(s).

The Graduate Program Committee Chair must then approve the proposed program. A program of study should be approved before it is embarked on, and therefore should be proposed early in a student's doctoral program. Changes in a program must be approved through a "revised" minor proposal submitted to the Chair of the Graduate Committee. The student's research

supervisor must sign and approve the revised minor proposal. (See Form in Appendix)



The program of study that constitutes a minor must be well separated from the student's Academic Program subjects and thesis research area. Normally this means that the subjects are taken outside the Department, in a field not directly related to science and engineering.

The subjects taken to satisfy the Minor Requirement must be at an advanced level. It is recommended that two related graduate level courses be taken (24 units). Minor Programs composed of one graduate level and one advanced undergraduate level course (24 units), or three advanced undergraduate courses (33 units), that were not used to obtain a bachelors or masters degree, may also be acceptable. An exception is a minor in a beginning language sequence where two 9-unit G subjects would most likely be approved.

Proposal for a Minor Program

Students must submit a Request for Minor Approval Form outlining the proposed Minor Program to the Graduate Program Committee for approval. The form must include:

- a. A description of the student's prior work in the proposed area if any;
- b. An explicit demonstration that the proposed program fulfills all of the requirements for the Minor Program;
- c. Attached copies of the catalogue descriptions of all subjects included on the form;
- d. An endorsement of the proposal by the student's research supervisor stating the program is coherent and distinct from both the student's thesis research and the field in which the student has taken the Oral Examination.

G. Subjects Taken Outside MIT

Students with demonstrated professional competence (for instance, a graduate degree) in a field separate from Biological Engineering may petition the Graduate Program Committee to use that experience to satisfy the Minor

Requirement. Units and subject level requirement are the same as for subjects taken within MIT.



H. Foreign Language

There is no foreign language requirement for the doctorate in Course XX. Candidates for whom English is a second language should take pains to ensure that their thesis is rendered in Standard English. The supervisor is not obligated to rewrite substantial portions of the thesis into acceptable forms.

I. The Doctoral Thesis

Doctoral Candidates (who have passed the General Examination) must complete a doctoral thesis that satisfies the Institute and Course XX requirements in order to receive the doctoral degree. General Institute requirements are described in the MIT Bulletin and in the Graduate Education Manual. Department's requirements and procedures are described below.

Ph.D. Thesis Committee

The student and research supervisor should agree upon members of a Thesis Committee and propose a Committee to the appropriate Graduate Program Committee Chair. During the summer of the second year, the student must submit the PhD Thesis Committee form to the Graduate Committee Chairs (Prof. White, copy to Academic Office) to request approval of the Thesis Committee membership. The Committee should be comprised of the thesis advisor(s) plus a minimum of two additional members, at least one of whom must be a member of the BE faculty. The Committee Chair (who presides at all Committee meetings, including the Oral Examination) must be a BE faculty member.

The Ph.D. Thesis Committee has the responsibility of advising a student on all aspects of the thesis experience, from the proposal process through the preparation and defense of the final document. The Thesis Committee must be approved prior to the scheduling of the thesis proposal/oral exam presentation, which must take place in the spring academic semester following the spring semester in which the General Written Exam is successfully completed.

It is expected that the student and supervisor will hold progress reviews with the entire Thesis Committee at least once a year. In addition to the Oral Exam/Thesis Proposal, the student must eventually present at least two



Regular Thesis Committee Meeting Reports (one of which must be a Final Thesis Committee Meeting Report) and a Thesis Defense to the Thesis Committee. Progress Reports are required once a year or more frequently if the Thesis Committee so requests. More frequent one-on-one meetings are strongly recommended. Thesis Committee Member changes must be approved by submitting a petition to the Chair of the Graduate Program Committee.

The first Progress Report must be held within one year of the Thesis Proposal/Oral Exam presentation. One week before the Progress Report meeting, the student should deliver annotated Specific Aims to each of the Committee Members. The aims should be 2 pages long (at most/ 12pt font). After each up-to-date Specific Aim, please add a few sentences outlining the status of that aim.

At the Progress Report presentation, the student should hand out photocopies of slides to the Thesis Committee Members (generally, this will be a print out of a PowerPoint presentation). Also, the student should provide the Committee Chair with an “Oral Examination for the Doctoral Degree” form to complete and submit to Academic Office.

Thesis Proposal/Oral Exam

A doctoral Thesis Proposal is required by December 1st following the calendar year in which the Written Exam is successfully completed. This proposal consists of a document submitted to an approved Thesis Committee at least one week prior to an oral presentation of the proposal to the Committee and a general audience. The document should not exceed 20 printed pages; exceptions can be made by prior agreement with the thesis committee. The Thesis Committee must approve the Thesis Proposal but no letter grade is given.

Thesis Proposal Guidelines (with recommended page lengths)

Title Page (One page) Include the title, the date, your name and signature, the advisor's name and signature, and the notation “Thesis Proposal”. Note that a signature from the Academic Office is also required to confirm that your proposal adheres to the format described here.

Abstract (Less than 300 words on One page) State the significance of the proposed research. Include long-term objectives and specific aims. Describe



concisely the research design and methods for achieving these objectives. Highlight the specific hypotheses to be tested, goals to be reached, or technology to be developed, which are intended to be your original contributions. Avoid summaries of past accomplishments.

Overall & Objective Specific Aims (One page Maximum) Articulate the overall objective of your thesis project, and outline a set of specific aims by which your work is intended to accomplish this objective. Be sure to clearly state the hypotheses to be tested, goals to be reached, or technology to be developed.

Background & Significance (Three to Five pages) Sketch the background leading to the present research, critically evaluate existing knowledge, and specifically identify the gaps that your research is intended to fill. State concisely the importance of the research described in this proposal by relating the specific aims to the broad, long-term objectives.

Research Design & Methods (Six to Eight pages) Along with the Objective & Aims section, this is the most important part of the proposal. The majority of your time should be spent making this part of your proposal strong, direct, and completely clear. Describe the research design and the procedures to be used to accomplish the specific aims of the project; it is generally most effective to do this according to the same outline as in the Objective & Aims section. Include how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, provide a tentative timetable for the project. Point out any procedures, situations or materials that may be hazardous and the precautions to be exercised.

Preliminary Studies (Three to Four pages) This section may alternatively be located before the Research Design & Methods section) Use this section to provide an account of your preliminary studies that are pertinent to your research project and that support your specific aims. Note: it is not necessary to have obtained a substantial amount of preliminary data in order to submit or defend the proposal, although it will be expected that you have begun to undertake some of the key methods to assess their feasibility.



Literature Cited (No page limits) List all references. Each reference must include the title, names of authors, book or journal, volume number, starting and ending page numbers, and year of publication. References should be limited to relevant literature. References are not included in the page limits. However, only references pertinent to the proposed research should be included.

Appendix (No page limits) Copies of published or submitted articles pertinent to the proposed research for which you are an author may be included. Such publications are neither expected nor required at the time of Thesis Proposal presentation.

Format and Page Limitations Proposals must be single spaced using 12 pt font and 1 inch margins. Figures may be embedded into the text, but they must be readable. The font within figures must be at least 9 point and the figure captions must be at least 10 point.

Devote one page each for the title page, abstract and specific aims.

Use between 13–17 pages for the remaining sections (Background & Significance, Preliminary Results, and Research Design & Methods). Note that although the maximum recommended page limits for these sections add up to a total of 17 pages, you are expected to expand and contract these sections as you see fit so that the total is no more than 17 pages.

Page limits include both text and figures. References are not included in the page limits.

The total length of the document should not exceed 20 pages (including 3 pages for the title page, abstract and specific aims; not including references or appendices).

Guidelines on Annual Thesis Committee Meetings

Annual Meetings: The Department requires annual Thesis Committee meetings for all graduate students that are past their Thesis proposal stage. These meetings help to ensure satisfactory progress towards the student's intended defense and graduation dates. These meetings also help ensure seamless communication across the entire Thesis Committee on the

student's aims, progress, and any issues encountered during their thesis research trajectory.



Meeting Preparation: Two weeks prior to each Committee Meeting, the student is encouraged to share an annotated set of Specific Aims with their Committee. The annotated Specific Aims should be approximately one to two pages long, with a few sentences describing the status of each Aim and a Gantt Chart showing the anticipated timelines for their completion. At the Committee Meeting, the student is encouraged to hand out hardcopies of their presentation slides to their Thesis Committee Members, which may include a summary of their Specific Aims. They should additionally bring hardcopies of their Thesis Committee Progress form for each Committee Member, which should be filled out by the student prior to the meeting.

Meeting Format: The Department encourages in-person meetings with all Committee members present whenever possible. The specific format of the meeting is described below:

- Committee meetings should be scheduled for 1.5 hours
- Committee meetings are run by the Chair of the Thesis Committee
- Start of meeting:
 - Student leaves room: Committee checks in with advisor(s)
 - Advisor(s) leave room: Committee checks in with student
- Body of Meeting:
 - Bullet-point overview of progress toward PhD
 - accomplishments, goals, anticipated timeline
 - Specific Issues to be addressed
 - Anticipated career trajectory
 - Detailed Scientific Progress
 - Including risks and alternate pathways
 - Publication Plan
- Close of Meeting:
 - Reiteration of PhD objectives and anticipated timeline

Plan-to-Defend Meeting: The Department recommends that the final, Plan-to-Defend Committee meeting be held at least six months prior to the planned Thesis Defense date. At this meeting, students are strongly encouraged to share with their Committee a Gantt Chart illustrating the timeline towards their defense date (see example attached), including specific objectives and deadlines leading up to the anticipated Defense.



Meeting Remediation: While the Department recognizes that there may be extenuating circumstances leading to a delayed annual Thesis Committee meeting, which do not merit withholding registration, the Department reserves the right to withhold registration if the one-year mark past the regular annual Committee meeting schedule has passed. This circumstance implies that two years have elapsed since the last regular Thesis Committee meeting, all e-mail reminders and meeting attempts have failed to realize a subsequent meeting, and the Graduate Committee has determined that withholding registration is in the best interest of the student.

Example Gantt Chart for the final, Plan-to-Defend Thesis Committee Meeting (December) prior to the Thesis Defense (May):

	DEC	JAN	FEB	MAR	APR	MAY	JUN
Plan-to-Defend Thesis Meeting							
Manuscript Submission							
Thesis Writing							
Deliver Thesis & Verification From to Committee							
Thesis Defense							
Thesis due to Academic Office							
Employment Start-Date							



Doctoral Thesis and Oral Defense of the Thesis

The Department's long-standing emphasis on original research is a key element in the Candidate's educational development.

The thesis defense has two stages: i) a final Thesis Committee Meeting report, and ii) a defense. The final Thesis Committee Meeting report involves only the student and the Thesis Committee. The final thesis meeting must include all members of the Thesis Committee. In highly unusual circumstances, the Chair of the Graduate Committee may approve faculty absences or substitutions for the preliminary exam. Such approval must be obtained in writing at least one week in advance of the meeting. Approval is only possible with written support from the chair of the Thesis Committee and the faculty member to be replaced or absent.

At least one week prior to the final Thesis Committee Meeting, the student will hand deliver copies of the final thesis report document to the thesis committee members. The final thesis report usually will involve a brief presentation summarizing research results and the contents of the thesis document. The Thesis Committee will prepare a set of comments, suggestions, or requirement, as necessary for further experiments, more careful data analysis, more rigorous interpretation, or improved expression. If the Thesis Committee discovers major deficiencies, a second progress report may be required.

The Thesis Defense is open to the public. The defense can only be scheduled after all deficiencies identified in the final Thesis Committee meeting report have been addressed. In no case will the defense occur sooner than two weeks after the final Thesis Committee meeting. At least two weeks prior to the defense, the Candidate will hand deliver copies of the final thesis document along with the [thesis verification form](#) to the Thesis Committee members. The committee members must decide within these two weeks if the thesis document is acceptable to proceed to defense. If the thesis is unacceptable, the defense will be rescheduled following correction of the thesis. It is the student's responsibility to reserve a classroom for the Thesis Defense. If the student wishes to reserve one of the BE Classrooms (56-614, 16- 220), they should contact the BE Academic Office, any other classroom reservation must be reserved through the Registrar's Office: classrooms.mit.edu



The defense begins with a formal presentation of approximately 45 minutes based on the thesis. The floor is then opened to questions from the general audience, which is thereafter excused. The Thesis Committee, and any other MIT faculty that wish to remain, continue the examination of the Candidate in private. The Candidate and any non-Thesis Committee faculty still present are finally excused from the room for the final Committee deliberations and decision. A majority yes vote is required to approve the thesis. It is the responsibility of the Thesis Committee Chair to give the Committee's decision whether the thesis is satisfactory or unsatisfactory to the Candidate and to the BE Student Office. In the event of vote not to pass, the Thesis Committee will make recommendations as to needed changes to render the thesis satisfactory. The revised thesis will then be submitted for a second final defense.

Note: Students are advised to keep in mind that the months of May and August tend to be the months where scheduling a presentation may be difficult because of faculty unavailability.

Thesis Format

Candidates should consult "Specifications for Thesis Presentation" (MIT, 2013), available on the web at <http://libraries.mit.edu/archives/thesis-specs/>

Students who would like assistance in improving their writing skills or in any stage of writing a thesis proposal, final thesis, and even resumes and job application letters should contact:

- [BE Communications Lab](#) 56-211 at 617-324-4564, staffed by the BE Communication Fellows, the Lab offers writing and speaking support for engineers by engineers.
- MIT Writing and Communications Center WCC, E18-233 at 253-3090 <writing-center@mit.edu>. The Writing Center offers individual consultations and advice about any writing problem and is open to all members of the MIT community.

Final Defense Requirements

Following the satisfactory completion of the Final Thesis Committee Meeting, doctoral students can commence the Thesis Defense process. The

following Checklist describes in detail the procedures for preparing and submitting a Thesis pertaining specifically to the Doctoral Thesis Defense:



1. Student must meet all program requirements
2. Complete an Application for Advanced Degree (online – WebSIS)
3. Student must give the Thesis Committee Chairperson an Oral Examination Thesis Proposal and Defense Form to verify that the Thesis Defense was acceptable, and return the completed and signed form to the BE Academic Office (16-267) within two weeks.
4. Submit the following to BE Academic Office (16-267):
 - a. Two copies of thesis (**printed on acid-neutral paper**) with original signatures:

Title page should include: Your original signature, Advisor's original signature, Graduate Program Chair original signature (Forest White).

Second Page should include: List of all Committee members who voted in favor of your defense
 - b. Complete UMI form:
<https://libraries.mit.edu/archives/thesis-specs/images/umi-proquest-form.pdf>
 - c. Complete a Graduate Exit Survey online at
<http://web.mit.edu/surveys/grad/phdexit/>
 - d. Receive a receipt from Academic Office for submitted Thesis

MIT Libraries charges a thesis fee of \$115, which is automatically and directly added to a student's personal MITPAY account. A student facing financial hardship may petition the BE department administrator to reimburse the thesis fee. A student's thesis advisor may also reimburse the fee.

J. Master of Engineering in Biological Engineering as Recommended by the Department of Biological Engineering

In special cases, a student may petition the Graduate Committee to recommend, on behalf of the Department, the awarding of a Master's degree (SM) without field specification. The requirements for this degree are a minimum of 66 units, approved for "G or H" credit, of which 42 units must be "Graduate H" level. The petition should be submitted early in the student's

residence. Graduate Thesis or research units cannot be used toward the 66-unit requirement.



Required Subjects & Units

20.200 + 20.S952

-Plus-

Additional courses to be determined based on the student's needs/interests in consultation with the advisor. Please note: SM candidates are required to take a minimum of 66 graduate units of course credit; at least 42 of these units must be "H" level. Research (20.950) and Thesis (20.951 and 20.THG) do not count towards the unit requirement.

Thesis Requirement

The SM candidate must write and submit an acceptable Thesis in the field of Biological Engineering that is approved and signed by the research advisor and the Chair of the Graduate Program Committee. The format should follow the same format as the PhD thesis (P. 23). The student must provide a final version of the thesis to the Academic Office by the date posted on the MIT Academic Calendar. The thesis supervisor and the Chair of the Graduate Program Committee must sign the title page of the thesis. An internal Course XX thesis reader is required if the student's advisor is outside BE.