

## Steps to a Doctoral Degree in the Interdepartmental Program in Transportation

1. Complete **General Exam Part 1 and Part 2** [by end of AY2]
2. Complete **Responsible Conduct of Research** course [by end of AY2]
3. Formation of Doctoral Thesis Committee following completion of General Exam
4. **Approval of Doctoral Research Proposal** [by Dec. 31, AY3]
5. Meet regularly [minimum of once per year] with Doctoral Thesis Committee
6. Doctoral Degree earned with satisfactory defense of the Ph.D. thesis [AY 5 or 6].

## Doctoral Program

A Doctoral Program in the Interdepartmental Program in Transportation consists of 120 units of graduate level coursework, including a **2-Subject Core**, selected from a set of five defined areas. The student should consult their faculty advisor when preparing their Doctoral program of study. The **2-Subject Core** is tested in **Part 1 of the General Exam** (below).

There are five approved core areas defined by the subjects listed below.

- Transportation Systems Analysis: 1.200
- Performance and Optimization: 1.203 and (15.093 or 15.058)
- Planning and Policy: 1.251 and 11.478
- Networks: 1.208 and 15.081
- Logistics: 1.260 and (15.764 or (15.871 + 15.872))

Each student must select two of these five areas. The two selected areas **must include Transportation Systems Analysis**.

The remainder of the doctoral program consists of a set of subjects in transportation and related fields. MIT graduate-level subjects taken to fulfill the requirements of the MST degree may be included in the doctoral program

## Transfer Credit

Up to 24 units of graduate credit taken outside MIT may be transferred to the Interdepartmental Doctoral Program. All transfer credits must be related to the proposed doctoral research area. The CEE Academic Programs Office must approve transfer credits from outside of MIT.

## Thesis Supervision

A student's thesis supervisor can be 1/MIT Interdepartmental Transportation Faculty member(s) or MIT Interdepartmental Transportation Senior Research Scientist/Engineer. A thesis supervisor is responsible for certifying and signing the thesis. In the case of co-supervisors, both must certify and sign the thesis.

### *Emeritus faculty*

Emeritus faculty can be involved in mentorship of graduate students at their discretion, without compensation. They can serve as co-advisors as long as there is a primary advisor who will provide funding and who is actively engaged in supervising a student. It is acceptable for emeritus faculty to serve as PhD committee chair.

### **Research Requirement and 1.THG**

Research plays an integral role in the PhD degree, and this research effort is tracked academically through enrollment in 1.THG. In the Interdepartmental Program in Transportation, we require graduate students to register for 1.THG every term. The number of credit hours is determined in consultation with your advisor. If a student is registered only for 1.THG during a term, the program recommends a load of 36 units. Through enrollment in 1.THG, students are formally graded on research performance each semester, in accordance with MIT Faculty Rules and Regulations 2.62.3. <http://facultygovernance.mit.edu/rules-and-regulations>

### **Summer Tuition Subsidy**

Graduate students who are enrolled in a research degree program and who are **not** taking subjects are eligible to have their summer tuition subsidized from Institute general funds.

The subsidy applies to new or continuing graduate students in normal resident status during the preceding spring term, and who are only registered for thesis or pre-thesis research credit during the summer.

Some key points to remember:

- Graduate students who register for other summer subjects will be charged tuition on a per unit basis up to the maximum tuition.
- Students registering for summer internship subjects are not eligible and will be charged the per unit rate, up to a maximum of four units.
- Be sure to confirm with your advisor before registering for any summer subjects.

The Registrar's office oversees this subsidy and the source information for the points noted above can be found here: <https://registrar.mit.edu/registration-academics/tuition-fees/graduate/summer-tuition-subsidy>

### Responsible Conduct of Research

Each PhD student is required to complete MIT’s online course on the Responsible Conduct of Research within the first two years, i.e. by the end of Spring term AY2. If you are paid on an NSF grant, you are required to complete the course within 60 days of being assigned to the grant. You can access the course from this web site and following the instructions below. You will need an MIT certificate.

<http://osp.mit.edu/compliance/responsible-conduct-research/take-training>

1. On the bottom of the page, click on “accessing the site for the first time”

**Quickcards**

Quickcards in PDF format for RCR training can be downloaded here.

Accessing the CITI site for the first time 


Accessing CITI for additional training

Affiliating CITI training with MIT

2. From there CITI will ask you to create a password.

3. After you have created your new password, click on “Add a course or Update Learner Group”

My Learner Tools for Massachusetts Institute of Technology

 You are not enrolled in any courses for this institution. [Click here to complete your enrollment.](#)

 [Add a Course or Update Learner Groups](#)

[View Previously Completed Coursework](#)

[Update Institution Profile](#)

[View Instructions page](#)

[Remove Affiliation](#)

4. Go to question 4 and select, RCR for Engineers

5. You should then see that the course has been added

Massachusetts Institute of Technology Courses		
Course	Status	Completion Report
Responsible Conduct of Research for Engineers	Not Started	Not Earned

6. Complete The Integrity Assurance Statement before beginning the course

7. Once you have completed the course (12 modules with 80% or better on the individual quizzes) send a screen shot of your completion report to the graduate academic administrator, Kiley Clapper (kclapper@mit.edu).

## General Exam

All doctoral students are expected to take the General Examination no later than the fourth semester of graduate study at MIT. The General Examination is conducted once per academic year, usually in the Spring term. The written exam is administered first and the oral exam takes place approximately 1-2 weeks after the written exam.

The written exam is a take home, open book examination. The two separate questions correspond to the two areas of the doctoral core program, with every student required to be examined on the Transportation Systems Analysis (1.200) area on day 1 of the written exam. The subsequent exam question corresponds to one of the remaining four doctoral core program areas above, with each student selecting the area on which he/she will be examined. The two separate questions are administered over a 3- or 4-day period. Students will receive each day's questions at 9 AM and are expected to return the answer for that day's question by 6 PM. A student may take the exam without taking for credit the corresponding subjects, and the student need not take these subjects if the exam is passed. Credit for subjects not taken, however, will not be granted.

The oral exam is scheduled through the Academic Programs Office and the exam committee, date, time and location is assigned to the student in advance. The student must submit, electronically to the committee, a research paper of up to 7 pages at least 1 week prior to the *oral* exam date. In the oral part of the General Examination, the student presents that research to demonstrate the student's *potential* to complete original work at the doctoral level. The research presented could be based on the student's master thesis and does not need to be on the topic of the doctoral research. This presentation generally lasts about 30 minutes, followed by up to one hour of questions from the faculty members in attendance. Although questions usually focus on the student's oral presentation, faculty members may also ask specific questions related to the student's doctoral core program and the written exams.

Normally students complete both the written and oral portions of the General Examination before being informed of the outcome. There are four possible outcomes of the General Examination:

1. Pass the General Examination with approval to proceed with dissertation research.
2. Fail the General Examination with a recommendation to retake the oral portion of the exam.
3. Fail the General Examination with a recommendation to retake the written portion of the exam.
4. Fail the General Examination with a recommendation that the student *not* retake

the exam.

Students who fail the general exam on their first attempt have the option to retake the exam a second time.

The faculty involved in both the oral and written exams will deliberate with respect to a student's performance in the General Examination.

After passing the General Examination (written and oral) students are designated as *doctoral candidates*.

### **Doctoral Thesis Committee and Approval of Doctoral Research Proposal**

After passing Part 1 and Part 2 of the General Exam (typically at end of AY2), the student forms a Doctoral Thesis Committee and within one academic term schedules a defense of Doctoral Research Proposal, i.e. typically by the end of Fall Term AY3. The Doctoral Thesis Committee is composed of at least two members of MIT Interdepartmental Program in Transportation's faculty or senior research staff. If appropriate, the student may invite members from outside MIT. The Committee Chair must be a faculty member of the Interdepartmental Program in Transportation. Once the Thesis Committee is formed, the student prepares a Research Proposal and schedules a date to present the proposal orally to the Doctoral Thesis Committee. The objectives of the research should be prepared with guidance from the advisor. Because most doctoral research is funded by existing projects developed by the advisor, it may need to meet specific benchmarks. The proposed work must accommodate these constraints. The proposal should be a maximum of 15 single-spaced pages. The necessary components are given below. The oral presentation is 45 minutes, followed by 45 minutes of questions.

#### *Required Components in the Research Thesis Proposal*

The thesis proposal should be a maximum of 15-pages of single-spaced, 12-point font. Figures are included in the page count, but references are not. The following sections must be included.

**Abstract** - A one-page (or less) summary of the topic, the objectives/hypotheses to be achieved/tested, and the methods. The abstract should be written for a general scientific audience, i.e. a person unfamiliar with the topic should understand what is being proposed and why it is important.

**Introduction** - The goal of this section is to motivate the research. Convince the reader why the project is important. The following progression is recommended. Introduce the topic and explain the broader relevance, e.g. what is the practical or fundamental importance. Demonstrate familiarity with previous studies. Identify knowledge gaps and connect to the proposed research.

Objectives and Hypotheses - Clearly state the research question to be answered and/or hypotheses to be tested and support it by explaining the logic that led to it. Preliminary data may be used as support.

Proposed Research - Describe the methods in sufficient detail to give a clear picture of how each research question will be answered and/or how each hypothesis will be tested. Include a time-line to demonstrate that the proposed work is feasible within the duration of a PhD degree. Describe specific expected results.

#### *Defense of Thesis Proposal to Doctoral Thesis Committee*

At least 10 days prior to the proposal defense, the student e-mails copies of the written proposal to the committee members with a final schedule of when and where the presentation will take place. After e-mailing the proposal to the committee, the candidate should neither solicit nor expect to receive feedback from any of the committee members, including the advisor, prior to the presentation. On the day of the proposal defense, the student brings a copy of the form, Record of Approval of Doctoral Thesis Research, which is available at <https://cee.mit.edu/resources/>.

During and after the oral presentation, the Committee members ask questions related to the presentation, the written proposal, and the general topic of the proposed research. The Committee may raise questions about the motivation, novelty, potential impact, and feasibility. As in the Part 2 evaluation, the research advisor is encouraged to ask questions, but should not answer questions. If necessary, the advisor may prompt the student with further questions to help them answer on their own. Remember that this is a test of the student's understanding and research ability. It is not a test of the advisor.

At the end of the question period, the student is asked to leave the room while the Committee (including the advisor) evaluates the candidate's performance in these areas: quality of written presentation, quality of oral presentation, technical quality of proposed research, feasibility of research within duration of degree, ability to respond to questions. The possible outcomes are:

- 1) Accept as written
- 2) Accept with modification
- 3) Retake within 6 months - the committee must include a list of specific deficiencies
- 4) Fail with specific notes on deficiencies (Only if this is second attempt)

The Committee Chair records the outcome and any specific requirements for alteration on the form Record of Approval of Doctoral Thesis Research. The Committee Chair forwards the completed form to the Interdepartmental Program in Transportation Graduate Academic Administrator (Kiley Clapper) at the Academic Programs Office (Room 1-290) and provides a copy to the student.

After the approval of the thesis proposal, the student schedules regular meetings with the doctoral committee to demonstrate progress and receive feedback. Two meetings per year are strongly recommended, with a minimum requirement of one per year. In addition, the committee chair may require additionally meetings in response to significant problems or changes in research direction. The student should bring a copy of the form, Record of

Doctoral Thesis Committee Meeting, to each meeting. The form is available at <https://cee.mit.edu/resources/>. The student should bring the original, signed form to the Academic Programs Office (1-290), and should keep a copy of the form for their own records. The minimum requirement will be assessed during each Interdepartmental Program in Transportation Grades Meeting (January and May) using the forms on file at the Academic Programs Office.

### **Approaching the Defense of a Doctoral Thesis**

A few months before an anticipated doctoral defense date, the student must convene a final committee meeting. During this meeting the student's presentation should include an outline of the full thesis, highlighting results from each chapter, indicating papers published, in review or in prep, and including a detailed timeline for completion. The committee will provide the student with their opinion of what is the weakest component of the work and what they foresee as possible stumbling blocks for completion. The committee will then decide whether to approve the outline and allow the student to proceed in scheduling the thesis defense; if the committee members all agree they will sign the "Green Light" *Thesis Committee Meeting* form, which then will be sent to the academic administrator. Only after the committee has given their approval, can the student move forward with planning his or her doctoral thesis defense.

### **Checklist for Doctoral Thesis**

MIT has three degree-granting cycles per year: February, June and September. Several months prior to the defense date, the student should register to be on the appropriate degree list, by going to [student.mit.edu](http://student.mit.edu), selecting "online degree application" and following the instructions. Once this registration is complete, the academic administrator will send the student a detailed email outlining the steps needed to complete the degree and organize the thesis defense.

### **Preparing for and Scheduling your Defense**

The date of a doctoral defense must be at a minimum two weeks prior to the department's thesis submission deadline. The date changes each year, so the student must check with academic administrator to find out the date for a particular degree list. Note that the first draft of the thesis must be sent to the committee two weeks before the scheduled defense date. At least 10 days prior to the defense date the student should communicate the date, time and location with the academic administrator and fill out the abstract template, which is available from the academic administrator. The student should also send an electronic copy (pdf preferred) of the thesis draft to be shared with the CEE and Transportation faculty prior to the defense.

### **Planning the Public Presentation.**

The formal thesis defense has two components, the public presentation, which anyone can attend, and a closed session with only the thesis committee. The entire thesis committee must attend the defense, either in person or remotely via web-conferencing. The public presentation should be 40 minutes long, with ten minutes for questions at the end. The defense (particularly the introduction) should thus be understandable to a broad audience. The closed session will range from 30 minutes to 1.5 hours long.

To book a room, the student should work with the administrative assistants in Pierce or Parsons. We suggest a reservation of 2.5 hours – with a start time 15 to 20 minutes before the scheduled defense start time and an end time 15 to 20 minutes past the projected meeting end.

**Submitting the Thesis to the Academic Programs Office**

After a successful defense the committee will usually request small edits to the document. Once the updates have been completed and communicated to the committee, the student submits two signed copies of the thesis printed on acid-neutral or archival bond paper, by 5 pm the day of the department's deadline. (The academic administrator will provide this date.) The academic administrator will be responsible for retrieving the signature of the Chair of the Graduate Program Committee, so the student should not contact him/her directly. The copies must be unbound but secured between heavy cardboard covers with a binder clip. The front cardboard cover of each thesis copy should feature a photocopy of the top half of the thesis signature page (from the copyright up), which can be simply taped or glued on.

**Congratulations!!**

We look forward to the hooding ceremony and graduation to celebrate. Please let us know what is next by filling out the Graduate Student Exit Form:  
<http://cee.mit.edu/graduate/exitform>