

MIT Department of Nuclear Science and Engineering

Master of Science Degree Requirements

Summary:

66 units of graduate subjects.

- Undergraduate subjects may not be counted.
- English proficiency subjects also may not be counted.
- No more than 12 units of independent study and professional development coursework (22.901-22.904, 22.93) may be counted.
- Research subjects (22.ThG and 22.94) may not be counted.

48 of the 66 units must be taken within the NSE Department.

- 12 units of Core subjects are required (22.101 or 22.102 + 22.103).
- Special subjects may not be counted, except by petition.

Cumulative GPA of 3.5 exclusive of thesis is required to qualify for the Master's degree.

- Cumulative GPA including thesis must also be at least 3.5.

Master's Thesis (see below for more information)

- Must have an NSE faculty member as either research advisor or reader. Senior or Principal Research Scientists (whether NSE or not) are allowed, but require an NSE faculty member as the thesis reader.
- A *thesis prospectus* must be submitted during the first term that a student is registered for thesis (deadlines will be emailed, but roughly halfway through the term).

Required Subjects for the S.M. Degree

12 units of Core subjects are required for the S.M. degree:

- 22.101 Applied Nuclear Physics
- 22.102 Applications of NSE + 22.103 Nuclear Technology and Society

Academic Research

- Students should register for thesis (22.ThG) each term.

Recommended Subjects for the S.M. Degree (specializations)

- Nuclear Reactor Engineering: 22.211, 22.312, and one of (22.39, 22.313, or 22.315)
- Nuclear Reactor Physics: 22.211, 22.312 and one of (22.212, 22.213, or 22.251)
- Nuclear Materials: 22.71, 3.20 (thermodynamics) and one of (22.72, 22.73, 22.74, 22.76 or 3.21 (kinetics))
- Fusion: 22.611, 22.62, and one of (22.63, 22.612, 22.615, 22.616 or 22.67)
- Nuclear Science and Technology: 22.51, 8.511 and one of (22.90, 8.333, or 8.421)
- Nuclear Security and Policy: 6.3702 (formerly 6.431), 22.90, + one specialist subject by petition

Master's Thesis Research

Research may be undertaken in nuclear engineering or in a related field. A Master's thesis is normally completed within 12-18 months. Students should use this as a guide in planning their research schedule. No student will be allowed to register for more than three semesters of Master's thesis work without petitioning for and receiving the express consent of the Departmental Committee on Graduate Students. Once initiated, a Master's thesis must be completed before a student may start doctoral research.

Department Regulations for Thesis Advising – eligibility for research advising:

- **NSE FACULTY** (NSE faculty; NSE faculty emeritus; NSE professor of practice; faculty having dual and joint appointments with other departments).
- **Non-NSE MIT Faculty and NSE (and affiliated labs — PSFC and MITR) Senior and Principal Research Scientists/Engineers.** This case requires an NSE faculty member as a thesis reader.
- **Visiting Professors, NSE (and affiliated labs — PSFC and MITR) Research Scientists/Engineers, and MIT Senior and Principal Scientists/Engineers (including MIT-Harvard programs).** This case requires approval from the NSE Graduate Committee and requires an NSE faculty member as a thesis reader.

Thesis Prospectus

Each thesis student is required to turn in one copy of a brief (5-10 pages) thesis prospectus to the Department Academic Office by the end of the eighth week of the first term of Master's thesis registration. Thesis registration may be cancelled if this requirement is not satisfied.

The prospectus should be a clear and well-organized preliminary report. It should contain:

- (1) an introduction to the subject, giving a brief general statement of the field of interest and a concrete statement of the limited area of work which it is intended to undertake;
- (2) a review of relevant background information;
- (3) the proposed method of solution;
- (4) a tentative time schedule for completion of the work;
- (5) the name of the faculty member who will act as research advisor, and reader to be selected by the student with the concurrence of the advisor;
- (6) signatures of research advisor and reader to indicate approval of the proposed research project. Either the research advisor or the reader must be a member of the faculty of the Nuclear Science and Engineering Department.

Thesis Progress

- It is the responsibility of the student to maintain a rate of progress that will ensure completion of the thesis within the three semesters allowed.
- The student must meet with all members of their thesis committee at least 6 months before they plan to submit the final thesis. The student or committee members may request additional meetings before or after the 6 month meeting. Committee meetings are organized by the student.
- The research advisor may require periodic, written reports on the progress of the thesis. Students should be prepared to submit these if requested.

Thesis Submission

Each graduate student preparing a thesis is responsible for compliance with Institute and Department instructions regarding thesis preparation. See (<http://libraries.mit.edu/archives/thesis-specs/>).

Prior to submission of the final written thesis, a draft complete in all particulars is required for editorial comment and professional appraisals by the research advisor and reader. In planning a schedule, the student should realize that in excess of one month has customarily been required to complete the editorial comment, professional appraisal, required revisions and review.

Use of Publications in the Thesis Document

Students who wish to incorporate prior publications into their thesis can include publications as appendices in the thesis (with permission from the publisher), and can cite them extensively. However, it is necessary to maintain a consistent voice and single authorship in the PhD thesis. Most papers are multi-authored, including the student's advisor. It is hard to separate who wrote what. PhD thesis must be single-authored by the student. So, unless the publications are truly single-authored by the student alone, they cannot form the main chapters. It is also necessary for a thesis to have a "grand theme" and a consistent notation. Just putting together papers of disparate topics together without the linkages is not acceptable. It is important to ensure there are enough technical details in the thesis - because of page limitations, most papers are more concise than thesis. NSE expects a thesis that is detailed enough. Students are in no way obligated to include prior publications in the thesis.

Please review the NSE Graduation Checklist to ensure that you submit all required materials, including your final thesis document and all required forms and surveys. Questions can be directed to the Academic Office.

Copies of the final thesis should also be distributed to your research committee, sponsor and/or fellowship donor, in whatever format they prefer.

SM to PhD (for students admitted as SM)

A student admitted for a SM degree must apply for admission to the doctoral degree program, using the online application system in the regular cycle, should the student become interested in a doctoral degree.