Graduate Study

The Department of Materials Science and Engineering (DMSE) offers the degrees of Master of Science, Doctor of Philosophy, and Doctor of Science in Materials Science and Engineering. The department also offers opportunities for interdisciplinary study through the programs in Archaeological Materials, Computational Science and Engineering, Polymers and Soft Matter, and Technology and Policy.

Admission Requirements for Graduate Study

General admissions requirements (http://catalog.mit.edu/mit/graduate-education/general-degree-requirements) are described under Graduate Education. Programs are arranged on an individual basis depending upon the preparation and interests of the student. Those who have not studied some thermodynamics and kinetics at the undergraduate level are expected to know the material covered in 3.010 Structure of Materials, 3.020 Thermodynamics of Materials, and 3.030 Microstructural Evolution in Materials.

Requirements for Completion of Graduate Degrees

The general requirements (http://catalog.mit.edu/mit/graduate-education/general-degree-requirements) for completion of graduate degrees are also described under the section on Graduate Education. Programs are arranged on an individual basis depending upon the preparation and interests of the student. Those who have not studied some thermodynamics and kinetics at the undergraduate level are expected to know the material covered in 3.010 Structure of Materials, 3.020 Thermodynamics of Materials, and 3.030 Microstructural Evolution in Materials.

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Master of Science in Materials Science and Engineering

The department offers a Master of Science degree in materials science and engineering. The general requirements for the master’s degree (http://catalog.mit.edu/mit/graduate-education/general-degree-requirements) are described under the section on Graduate Education. The coherent program of subjects (34 units, though not necessarily all DMSE subjects) must be approved by the Department Committee on Graduate Students. Of the 66 total units required for the master’s degree, 42 graduate degree credits are required to be in DMSE subjects at the graduate level. The thesis must have significant materials research content. An internal departmental thesis reader is required if the student’s advisor is outside DMSE.

The department may also recommend awarding a master’s degree without departmental specification; the general requirements (http://catalog.mit.edu/mit/graduate-education/general-degree-requirements) are described under Graduate Education. The thesis must be materials-related. An internal departmental thesis reader is required if the thesis advisor is outside DMSE.

Simultaneous Award of Two Master of Science Degrees for Students from Other Departments

Graduate students may seek two Master of Science degrees simultaneously or in sequence, one awarded by the student’s home department and the other by the Department of Materials Science and Engineering. The rules governing dual degrees (http://catalog.mit.edu/mit/graduate-education/general-degree-requirements) are found in the section detailing degree requirements under Graduate Education. Additional information on requirements that must also be met to obtain the Master of Science degree from the Materials Science and Engineering Department is available from the department.

Doctoral Degree in Materials Science and Engineering

The Department of Materials Science and Engineering (DMSE) offers a Doctor of Philosophy (PhD) and Doctor of Science (ScD) in Materials Science and Engineering (http://catalog.mit.edu/degree-charts/phd-materials-science-engineering); the program is the same for both degrees. The DMSE doctoral program provides an advanced educational experience that is versatile, intellectually challenging, and of enduring value for high-level careers relating to the generation and application of knowledge concerning materials. It develops students’ ability, confidence, and originality to grasp and solve challenging problems involving materials.

All students in the DMSE doctoral program have the same foundation of core requirements: four core subjects, two seminar-based courses, and first-year thesis research requirements. The courses define what the department considers to be the fundamental knowledge that serves as the basis of materials science and engineering as a discipline—what every PhD materials scientist or materials engineer from MIT ought to know. The first-year student seminars and core subjects provide a rigorous, unified foundation for subsequent advanced-level subjects and thesis research. The successful completion of the core requirements is assessed via the student’s performance in each subject.

Each doctoral student must take three post-core electives, selected from among the graduate subjects offered by the department (http://catalog.mit.edu/subjects/3) and approved by the thesis committee. A full range of advanced-level subjects is offered in a variety of topics, and arrangements can be made for individually planned study of any relevant topic. In addition, students are required to take a two- or three-subject minor program.

Students in the DMSE doctoral program must successfully complete the general examination, which consists of written and oral evaluations to qualify as a candidate for the doctoral degree:

- A core curriculum assessment and review of research progress during the first year of the graduate program
• A thesis area examination, in which each student is expected
to demonstrate a general understanding of the fundamentals
of their chosen field and deeper understanding of one or more
of its significant aspects that specifically relate to their thesis
topic, as reflected in their chosen elective and minor subjects.
The thesis area examination includes submission of a written
thesis proposal and an oral examination.

Doctoral candidates (who have passed the general examination)
must complete a doctoral thesis that satisfies the Institute
(http://catalog.mit.edu/mit/graduate-education/general-degree-
requirements/#doctoraldegreetext) and departmental requirements
to receive the doctoral degree. During their first semester, students
will meet with faculty members and evaluate research opportunities
available in each lab. Selection of a research lab and thesis project
is done by the student with the understanding that the student and
faculty member mutually agree on the general topic and content
area of the thesis. The research culminates in the writing of a
thesis document. The results of the research must be of sufficient
significance to warrant publication in the scientific literature;
depending on the research field, this publication can come in
the form of journal articles, conference proceedings, patents, or
combinations of these or other public disclosure formats. Visit the
DMSE website for additional information on the doctoral program
(https://dmse.mit.edu/graduate/programs/doctoral).

Interdisciplinary Programs

Program in Archaeological Materials
The Department of Materials Science and Engineering offers an
interdisciplinary doctoral program for individuals who wish to
consider the study of archaeology and materials science and pursue
research in the field of archaeological materials. Admission to the
program is through the department. The program requires four
core subjects—half in materials science and engineering, half in
archaeology—and six additional subjects. Many of the subject
requirements may be met with coursework in the Architecture;
Civil and Environmental Engineering; Earth, Atmospheric, and
Planetary Sciences; Mechanical Engineering; and Urban Studies and
Planning departments; or in the Technology and Policy Program; the
Program in Science, Technology, and Society; and the Anthropology
Department at Harvard University. Field research opportunities are
available, most notably in Mesoamerica and South America.

Computational Science and Engineering
The Computational Science and Engineering (CSE) doctoral program
(https://cse.mit.edu/programs/phd) allows students to specialize
in a computation-related field of their choice through focused
coursework and a doctoral thesis through a number of participating
host departments. The CSE PhD program is administered jointly by
the Center for Computational Science and Engineering (CCSE) and
the host departments, with the emphasis of thesis research activities
being the development of new computational methods and/or the
innovative application of computational techniques to important
problems in engineering and science.

For more information, see the program descriptions (http://
catalog.mit.edu/interdisciplinary/graduate-programs/computational-science-engineering) under Interdisciplinary
Graduate Programs.

Polymers and Soft Matter
The Program in Polymers and Soft Matter (PPSM) (http://
polymerscience.mit.edu) offers students from participating
departments an interdisciplinary core curriculum in polymer science
and engineering, exposure to the broader polymer community
through seminars, contact with visitors from industry and academia,
and interdepartmental collaboration while working towards a PhD or
ScD degree.

Research opportunities include functional polymers, controlled
drug delivery, nanostructured polymers, polymers at interfaces,
biomaterials, molecular modeling, polymer synthesis, biomimetic
materials, polymer mechanics and rheology, self-assembly,
and polymers in energy. The program is described in more detail (http://
catalog.mit.edu/interdisciplinary/graduate-programs/polymers-soft-
matter) under Interdisciplinary Graduate Programs.

Technology and Policy Program
The Master of Science in Technology and Policy is an engineering
research degree with a strong focus on the role of technology in
policy analysis and formulation. The Technology and Policy Program
(TPP) curriculum provides a solid grounding in technology and policy
by combining advanced subjects in the student's chosen technical
field with courses in economics, politics, and law. Many students
combine TPP's curriculum with complementary subjects to obtain
dual degrees in and either a specialized branch of engineering or an
applied social science such as political science or urban studies and
planning. For additional information, see the program description
(http://catalog.mit.edu/interdisciplinary/graduate-programs/technology-policy) under Interdisciplinary Programs or visit the
program website (http://tpp.mit.edu).

Financial Support
The Department of Materials Science and Engineering offers
assistantships and fellowships for graduate study. Research and
teaching assistantships are available in the fields in which the
department is active.

Inquiries
Contact the Academic Office at dmse-gradoffice@mit.edu for
additional information regarding graduate programs, admissions,
and financial aid.