DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

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.

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 for completion of graduate degrees are also described under the section on Graduate Education. Students completing a Master of Science degree are required to present a seminar summarizing the thesis. The department requires that candidates for the doctoral degrees go through a qualifying procedure and pass Institute-mandated general written and oral examinations before continuing with their programs of study and research, and that they satisfy a minor requirement. Information on the qualifying procedure and on the subject areas covered by the general examinations is available in the DMSE Academic Office.

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

All doctoral degree programs have the same foundation of required subjects:

Doctoral Program Core Requirements

<table>
<thead>
<tr>
<th>Subject</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.20</td>
<td>Materials at Equilibrium</td>
<td>15</td>
</tr>
<tr>
<td>3.201</td>
<td>Introduction to DMSE</td>
<td>3</td>
</tr>
<tr>
<td>3.202</td>
<td>Essential Research Skills</td>
<td>3</td>
</tr>
<tr>
<td>3.21</td>
<td>Kinetic Processes in Materials</td>
<td>15</td>
</tr>
<tr>
<td>3.22</td>
<td>Structure and Mechanics of Materials</td>
<td>12</td>
</tr>
<tr>
<td>3.23</td>
<td>Electrical, Optical, and Magnetic Properties of Materials</td>
<td>12</td>
</tr>
<tr>
<td>3.995</td>
<td>First Year Thesis Research</td>
<td></td>
</tr>
</tbody>
</table>

The completion of the core requirements is assessed via the results of the final examinations in each core subject.

In the thesis area examination (oral presentation and examination), students are expected to learn the fundamentals of their chosen field and to develop a deep understanding of one or more of its significant aspects. Students are required to take three further subjects from an approved restricted electives list. 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. The thesis area examinations for the doctoral degree are designed accordingly. In addition, students are required to take a two- or three-subject minor program.

Research is considered the central part of the educational process at the graduate level. Students choose research projects from the many opportunities that exist within the department, and work closely under the supervision of an individual faculty member. 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.

The department maintains a large number of well-equipped research laboratories, and there is significant interaction between them, including the sharing of experimental facilities and equipment. Most department members have access to the Materials Research
Laboratory (http://catalog.mit.edu/mit/research), which provides and maintains excellent central facilities and interdisciplinary research opportunities as described in the section on Research and Study.

**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.

**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).

**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.

**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 (dmse-admissions@mit.edu), Room 6-107, for additional information regarding graduate programs, admissions, and financial aid.