

Materials Science and Engineering

Course 3

There are few fields in science and engineering that are not concerned in some way with materials. Yet, while most other engineering disciplines make use of materials, only the field of materials science and engineering focuses directly on them. This extremely broad discipline ranges from atomic physics and chemistry to large-scale engineering analysis and design. Examples of achievements in the field are evident all around us. Smaller and faster devices in the electronics industry are almost entirely the result of materials improvements. Nanomaterial enabled batteries are revolutionizing energy storage and delivery. Modern metal alloys enable stronger infrastructure, lighter aircraft and vehicles, more efficient engines and energy generation, and decrease the environmental impact of manufacturing. Biomaterials form the basis for medical implants and artificial organs and are revolutionizing drug delivery and cancer therapy.

Materials Science and Engineering at MIT

MIT's Department of Materials Science and Engineering (DMSE) has long been considered a world leader in the field, based both on its scholastic stature and on the success its graduates have had in their professional employment. Recent DMSE graduates include a Gates Scholar, Rhodes Scholar and a NASA Space Shuttle Payload Specialist. Also, several are recipients of national fellowships which support their graduate studies (ex: NSF, NDSEG). It is the only department of its kind in which the research and academic programs treat all classes of materials (metals, ceramics, polymers, biological materials, and electronic materials) from a unified viewpoint.

The Department's reputation is due in large part to its highly regarded faculty. Faculty research projects range from the purely scientific to applied studies, and involve perspectives of chemistry, physics, biology, electronics, the archaeological and historical aspects of materials, design, and entrepreneurial ventures. A more complete

list of DMSE research activities may be found on the Department's website.

Undergraduate Program

The DMSE undergraduate curriculum includes general core materials subjects, taken in the sophomore and junior years, followed by advanced elective subjects that treat specific types of materials. Flexibility in the choice of elective subjects allows students to tailor their academic programs to suit their interests in a certain class of materials; for example, materials for the computer and electronics industry, biomaterials, or structural materials. Students receive instruction in the classroom and in the laboratory, where they use research-grade equipment.

The Department also has a strong Industrial Internship Program which requires two 10-week work periods (usually summers) in an industrial or governmental establishment. Reports from these work periods are accepted in lieu of the required S.B. thesis. As part of the Industrial Internship Program, these students may also apply for admission to the graduate school in the Department of Materials Science and Engineering. This Master's degree requires an additional six-month work period, a minimum of one additional academic term on campus, and the completion of SM subject requirements and thesis.

Research

Undergraduates are encouraged to participate in faculty research through the Undergraduate Research Opportunities Program (UROP). Students may earn academic credit or wages by conducting research in the Department under faculty or research staff guidance. Research facilities for DMSE students include individual faculty laboratories, as well as shared facilities run by the Materials Processing Center and the Center for Materials Science and Engineering, Institute for Soldier Nanotechnologies, and Departmental

teaching facilities including the new laboratories on the Infinite Corridor.

Additionally, the Department has a very active Society of Undergraduate Materials Scientists (SUMS). This group not only organizes social functions and assists in making professional connections, but also plays an important advisory role in coordinating and developing the Department's academic program.

Post Baccalaureate Opportunities

The wide-ranging field of materials provides the most promising and varied career opportunities for engineers and scientists today. Whether generalists or specialists, materials scientists and engineers are in demand in both the public and private sectors for jobs in research, development, production, and management/consulting. Many DMSE graduates go on to graduate school for more intensive study in materials, though the job market is also strong for Bachelor's degree graduates. An education in materials science and engineering also provides a natural preparation for further education and careers in medicine, law, and business. Course 3A is specially designed for students wishing to pursue these options.

Archaeology and Materials

Course 3C is a unique degree program in Archaeology and Materials, and offers students the opportunity to study prehistoric culture by studying the structure and properties of materials associated with human activities. This includes materials science and engineering, anthropological archaeology, and geology, and leads to the S.B. degree.

Contact Information

For more information about the undergraduate program in the Department of Materials Science and Engineering contact Professor Lionel Kimerling, MIT, 77 Massachusetts Avenue, Room 13-4118, Cambridge, MA 02139-4307; Email: lckim@mit.edu. Additional information is also available on the web at <http://www-dmse.mit.edu/>.

The MIT Bulletin, Courses and Degree Programs Issue, contains further information on the Institute, including all graduate and undergraduate courses and programs. For details on ordering the course catalogue, please visit the MIT Press Bookstore website at <http://mitpress.mit.edu/bookstore/bulletin.html>.

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