

# Overview of the Work and Recommendations of the Task Force on the Undergraduate Educational Commons

## Massachusetts Institute of Technology

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*This overview offers a brief introduction to the work of the Task Force on the Undergraduate Educational Commons, summarizing the motivations behind its establishment, the context in which it has worked, and its recommendations. The full report of the Task Force is available at <http://web.mit.edu/committees/edcommons/>.*

Central to the educational plan that accompanied MIT's chartering in 1861 was a belief that leaders of the new industrial age should be educated in a manner different from the classical education of that day. The plan celebrated practical education and eschewed dilettantism. Furthermore, MIT's founding President, William Barton Rogers, foresaw that the Institute's graduates would not only pioneer new, efficient ways to manufacture industrial goods, but would also lead in helping society guide technology toward its more beneficial applications. This aspiration was summarized in MIT's motto, *mens et manus*—mind and hand.

MIT and the world around it have evolved for a century and a half. In that time, the impact of science and technology on daily life has grown, and as a consequence the reach and importance of MIT's undergraduate education have increased. Keeping in mind the aspirations of William Barton Rogers, MIT long ago embraced, and continues to uphold, an expanded vision of its historical mission. The MIT Task Force on Student Life and Learning in 1998 articulated that mission as

the advancement of knowledge and education of students in areas that contribute to or prosper in an environment of science and technology. Its mission is to contribute to society through excellence in education, research, and public service, drawing on core strengths in science, engineering, architecture, humanities and social sciences, and management. This mission is accomplished by an educational program combining rigorous academic study and the excitement of research with the support and intellectual stimulation of a diverse campus community.

The imperative that MIT take a leading role in preparing each generation of young people to assume leadership positions in endeavors shaped by scientific and technological advances imposes an obligation on the MIT faculty to assess periodically the curriculum. Today, scientific and technical advances are proceeding at a dizzying pace. Any university that desires to provide an education at the forefront of technical knowledge must regularly ensure that its technical education remains focused on solving the great intellectual puzzles of the day while upholding the most rigorous academic standards. Yet MIT strives to do even more than this. Because MIT intends to prepare leaders for business, research, government, education, and society at large, it must also teach its students to be fluent in expression, knowledgeable of a wide variety of values and cultural assumptions, intellectually agile, confident in working with and leading groups of people, and socially assured. MIT's graduates must understand complex problems and the multiple perspectives required to address the human condition. Therefore, the MIT faculty must also make certain that its education in fields outside of science and engineering is as relevant and serious as it is in those fields.

Over the past two and a half years, the Task Force on the Undergraduate Educational Commons, a committee of two dozen MIT faculty members and undergraduates, has comprehensively reviewed MIT's "General Institute Requirements," the rigorous foundation in natural science, mathematics, technology, humanities, arts, and social sciences that forms the core curriculum of an MIT undergraduate education. The Task Force affirms the many ways in which this common curriculum has successfully prepared MIT's graduates for a lifetime of learning and leadership, but also recognizes that changes in the wider context in which we work require us to alter this curriculum in some very important ways:

- **Science and technology are changing.** The biomedical and information revolutions of the last decades are only the most visible and recent intellectual developments that have transformed human life during the years since MIT last undertook a thorough and fundamental review of its common curriculum. Traditional disciplinary research remains strong at the Institute; those areas of research that reside at the boundaries between academic disciplines, which address problems in areas like medicine, energy, and the environment that defy easy disciplinary categorization, are becoming increasingly more important.
- **The world is changing.** In the past half-century, the impact of science and technology on the lives of all inhabitants on the planet has grown. Scientific literacy and technological innovation are universally recognized as essential preconditions for robust economic development. The effect of science and technology on the lives of human beings is so great that scientific advances are impossible without the active involvement of governments and the popular understanding of science by its citizens. And, of course, technological advances in computation and data transmission, transportation, and logistics have made globalization a catchword and a practical reality for which all of society must be prepared.
- **Students are changing.** The student of 2006 is not the student of 1956, or even of 1986. Some of the most obvious differences are readily apparent in a brisk walk down MIT's Infinite Corridor. In 1960, 99 percent of MIT's undergraduates were white and 97 percent were men. Now, half of MIT's undergraduates are non-white, and almost half are women. Students at MIT today have a broader range of life experiences and more diverse secondary education, and they arrive with a wider array of career ambitions. They benefit from substantial shifts in society that have increased the number of women who go to college and pursue study in science and technology; expanded opportunities for minority students as a consequence of the civil rights movement; increased the fraction of students' parents who went to college; devoted greater attention to improving the quality of public-school education, particularly in science and mathematics; and stoked a growing interest in "hands-on" learning, integrated learning, and "making a difference" through education.

Over the course of its two-and-a-half years of deliberation, the Task Force has consulted broadly with the larger MIT community in a variety of settings. The Task Force now makes the following three high-level recommendations intended to enhance the rigor and relevance of MIT's undergraduate education.

1. **The portion of the General Institute Requirements that focuses on science and technology should provide greater flexibility in the choice of classes in the fundamental sciences while retaining the rigor that has been the historic hallmark of these classes.**

Presently, all MIT students are required to take six prescribed subjects in single-variable calculus, multi-variable calculus, classical mechanics, electricity and magnetism, general chemistry, and general biology. They round out their graduation requirements in technical subjects by taking two elective classes and one laboratory class, which are usually mandated by their majors.

In the future, MIT students will take eight classes as part of a new Science, Mathematics, and Engineering Requirement. Three of these classes will continue to be prescribed as in the past (single-variable calculus, multi-variable calculus, and classical mechanics). The remaining five classes will be taken from a very small and tightly regulated number of subjects organized into six foundational technical categories: chemical sciences; computation and engineering; life sciences; mathematics; physical sciences; and project-based experiences. Students will choose classes from five of these six categories. Classes in the final category—project-based experiences—will be learning opportunities that involve either design or creation. They will emphasize the synthesis of ideas and techniques, particularly leveraging the use of real-world problems to motivate the acquisition of disciplinary knowledge, and stress the cross-disciplinary interactions needed to address design problems.

**2. The Humanities, Arts, and Social Sciences Requirement should be clarified in order to provide a rigorous foundation in the study of human culture, expression, and social organization.**

Presently, students take eight subjects in the humanities, arts, and social sciences (HASS), divided into broad-based distribution classes and more focused electives. The current HASS requirement is overlain on the first half of the Institute's Communication Requirement, which may be fulfilled by taking many of the distribution classes and some of the elective classes. Breadth is maintained by requiring students to take distribution subjects from three out of five categories. Depth is fostered by requiring students to complete a "concentration," of three or four classes in a single discipline or field of study. The remaining classes are electives.

In the future, first-year students will generally take one of a small number of foundational electives affiliated with a new Freshman Experience Program. These special classes will focus on topics that have attracted great interest in human society and require multiple perspectives to grasp deeply, such as wealth and poverty, democracy, the self, and war and revolution. These classes will sponsor campus-wide events, such as lectures, plays, and performances, intended to engage the larger community in this set of critical human issues. The remaining three semesters of the first and sophomore years will be devoted to other foundational HASS electives. Distributed across the humanities, arts, and social sciences, these will introduce each student to major issues of culture and society and to the major approaches used in the humanities, arts, and social sciences to address them; impart to each student a confident facility in critical reading, writing, and oral expression; and develop in each student an ability to understand and interpret primary materials, such as original texts, interviews, performance, and survey results. They will seek to instill in each student confidence in working alone and collaboratively to understand culture and society at a more sophisticated level. As is often presently the case, the junior and senior year will focus more on advanced subjects in a particular field of the humanities, arts, and social sciences through the pursuit of a concentration.

3. **MIT should make it clear that acquiring experience living and working abroad is an essential feature of an undergraduate education, work to expand current international education programs that have proven successful in the MIT environment, and develop strategies to create other opportunities that are especially relevant to an environment that emphasizes science and technology.** The ultimate goal is to allow any MIT undergraduate who wishes to participate in a meaningful experience abroad to do so without financial or academic penalty.

Numerous innovative and effective programs of international study have grown up at MIT in the past decades that are well-adapted to the special challenges and opportunities for pursuing international study at an institution like MIT, which features many highly-structured majors and numerous competing summertime opportunities for its students. Among these are the MIT International Science and Technology Initiatives (MISTI), the Hyperstudio, the Cambridge-MIT Exchange (CME), the Minor in Applied International Studies, and the Development Lab (D-Lab). These highly effective programs, and more like them, have grown up through the hard work and entrepreneurial activity of MIT faculty and staff. It is time for the Institute as a whole to devote more attention to the maintenance and growth of these programs, to move them beyond their entrepreneurial phases. The Institute also must enter into a period of exploring yet more opportunities for its undergraduates to study and work abroad.

Along with these high-level recommendations, the Task Force has made other proposals that are intended to bring them to fruition. Among these are suggestions about developing a more unified approach to the first year experience; enhancing advising for first-year and upper-class students; improving the quality of classrooms and the mix of classroom types; rationalizing the scheduling of classes; reaffirming MIT's commitment to the racial, ethnic, gender, and class diversity of its students; enhancing the expertise devoted to improving the curriculum and classroom instruction; broadening the influence of new teaching techniques; and enhancing the capacity of the faculty and administration to share in the responsibility to ensure the continued excellence and ongoing renewal of MIT's undergraduate educational program.