



The Task Force on the Undergraduate Educational Commons

Faculty-Student Town Meeting
May 10, 2006



Purpose of the Task Force

The Task Force has been conducting a fundamental, comprehensive review of the common educational experience of our undergraduates.



“Working Principles for an MIT Education”

- A set of themes that helped frame our review of the GIRs:
 - A persistent passion for learning;
 - Intellectual diversity;
 - An innovative approach to core knowledge;
 - Collaborative learning;
 - Education for responsible leadership.

Major Recommendations in these Areas:

- Advising and Mentoring;
- International Experiences;
- Teaching and Learning;
- The Role of the Faculty in the Commons;
- Faculty Governance;
- The General Institute Requirements.

Task Force consensus on the GIRs

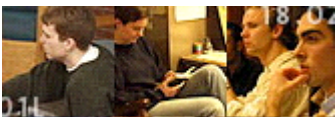
- The present structure of the GIRs is basically sound, but the content can be broadened.
- It is not possible to provide all the desirable educational experiences in four years.
- The GIRs should introduce the fundamental modes of analysis that we want our students to acquire.
- The goals of the various components of an MIT education should be made more explicit to students and faculty.

Goals for the First Year Experience

- Increase freshman motivation and enthusiasm;
- Improve teaching and learning by emphasizing active learning and project-based pedagogies;
- Increase choice and flexibility for students;
- Provide opportunities to explore potential majors.

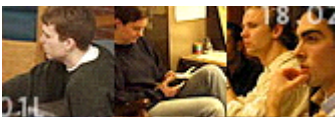
The Science-Math-Engineering Core: Recommendations

- Maintain the rigor and basic unified experience of the current Science Core;
- Expand the educational scope of the core and student choice -- but do not increase the number of requirements;
- Signal the importance of the essential modes of analysis;
- Increase the excitement/stimulation of the first year through new approaches to learning, especially project-based experiences.



The Science-Math-Engineering Core:

- Six core + 2 REST = 8 subjects (Lab Requirement is eliminated);
- Design challenge: how to organize these 8 subjects into a menu that broadens the present core, taking departmental programs into account;
- Each category would have a (very) small number subjects;
- Introduce category of Computation and Engineering;
- Provide the possibility of project-based core subjects as an option.
- Strong oversight and assessment.



New Science-Math-Engineering Core

SCIENCE/MATHEMATICS/ENGINEERING REQUIREMENT (8 subjects)

Required Subjects

Mechanics
Single-Variable Calculus
Multi-Variable Calculus

Distribution Subjects:
1 from each of 5 categories of the 6 below

<i>Mathematics</i>	<i>Physical Sciences</i>	<i>Chemical Sciences</i>	<i>Life Sciences</i>	<i>Computation & Engineering</i>	<i>Freshman Experience</i>
Differential Equations, Linear Algebra, Probability and Statistics.....	Electricity and Magnetism, Physics of...	Solid-State Chemistry, Intro to Chemical Science	Molecular Biology, Biology of...	Algorithmic Reasoning, Principles of Engineering	Project-Based Subjects in Engineering, Science and/or Design

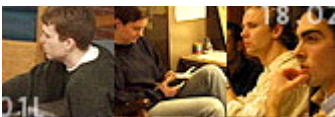
The Science-Math-Engineering Core: Project-based Experiences

- Provide students the opportunity to contribute to the definition of complex problems and to explore strategies for addressing them;
- Require extended study, reflection and refinement, and multiple modes of inquiry;
- Emphasize synthesis of ideas and techniques, especially the study of real-world problems to motivate the acquisition of disciplinary knowledge;
- Emphasize the design process and iteration;
- Enable creativity and communication skills;
- Integrate and motivate knowledge from other core subjects.



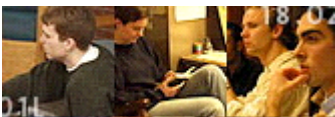
The Science-Math-Engineering Core: Computation and Engineering

- Subjects that focus on the modes of thought and problem-solving tools associated with computational modes of analysis and the engineering method;
- Computation subjects: to explore the role of algorithmic and data abstractions and the use of imperative knowledge in designing computational solutions to theoretical and practical problems.
 - Not simply introductions to programming languages
 - 6.001 may serve as a model, but others will be developed.
- Engineering subjects: to provide students with an appreciation of the trans-disciplinary principles of engineering and their use in problem-solving:
 - Use of abstraction
 - Processes of design and synthesis
 - Complexities of large systems in the context of modern technological society



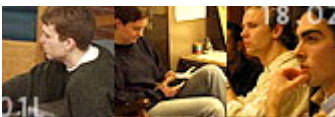
Humanities, Arts, and Social Sciences: Recommendations I

- Subject of an intense review by a Task Force-
empanelled subcommittee that included the HASS
Overview Committee (HOC);
- Maintain distinctive features and successes of current
requirement:
 - Strong signal to the outside world;
 - High-quality teaching across a wide variety of
fields;
 - Flexibility in pursuing passions, based on personal
interest, professional ambitions, or both;
 - Close collaboration between faculty and students.



Humanities, Arts, and Social Sciences: Recommendations II

- Strengthen impact of the requirement on the overall experience of students:
 - Concentrate energy and attention on “big ideas” and fundamental knowledge in early years at MIT;
 - Reduce complexity of requirement, to encourage intellectual engagement and discourage gaming;
 - Reduce barriers to collaboration, within the humanities, arts, and social sciences, and between HASS and other areas at MIT.



New Humanities, Arts, and Social Sciences Requirement

HUMANITIES, ARTS AND SOCIAL SCIENCES REQUIREMENT (8 subjects)

Required Subjects

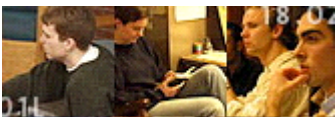
Freshman Experience
Expository Writing (if needed)

Foundational electives in HASS (1 subject from 2 out of 3 categories)

<i>Humanities</i>	<i>Social Sciences</i>	<i>Arts</i>	<i>Advanced Subjects</i>
			Concentration HASS Electives

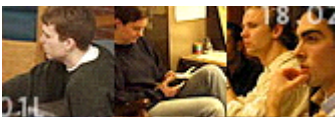
The HASS Requirement: Proposed

- Freshman/Sophomore years: Foundational Subjects (3)
- Junior/Senior years: Concentration Subjects (3-4)
- 1-2 elective subjects
- Communication Requirement (CI-H) may be integrated into foundational subjects.



The HASS Requirement: Proposed

- Foundational Phase
 - “Freshman Experience” subjects (1)
 - 10-16 subjects that emphasize “big ideas,” normally taken in the first semester;
 - Writing, understanding, digesting “raw inputs,” developing arguments, using libraries.
 - Freshman Communication
 - Freshman Essay Evaluation or expository writing
 - Foundational Electives
 - Entry-level distribution subjects
- Concentration Phase
 - Tighten-up current practices
 - Better defined, more transparent, more demanding.



How “Freshman Experience” Classes are Distinct from the Other Foundational Electives

- Goals of both types of classes:
 - Introduce each student to major issues in culture/society and to major disciplinary approaches to them;
 - Writing and oral communication;
 - Develop skills in understanding and interpreting “unmediated materials;”
 - Prepare students for deeper, more focused study.
- Special goals of Freshman Experiences subjects:
 - Big ideas, e.g., poverty, revolutions, democracy, globalization;
 - A more common experience for freshmen.

New GIRs: Full Model

HUMANITIES, ARTS AND SOCIAL SCIENCES REQUIREMENT (8 subjects)

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<i>Humanities</i>	<i>Social Sciences</i>	<i>Arts</i>
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<i>Advanced Subjects</i>
Concentration HASS Electives

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MIT SB Degree Programs: Rules

- The GIRs
- 17 subjects;
- 8 HASS subjects;
- 6 Science and Math
- Institute Lab
- 2 REST subjects;
- Departmental Programs
- 11 subjects (132 units)
- 12.5 allowed by CoC in special cases (150 units)
- 3-subject overlap with GIRs allows up to maximum of 15.5 subjects
- 180-198 units, including 48 unrestricted electives

32-34 subject programs

MIT SB Degree Programs

- Many science majors and most engineering degree programs are at the limit of what is allowed by the Faculty Rules;
- Most major programs in Science and Engineering depend on what is required under the current Science, Lab, and REST requirements;
- With our recommendations, SB degree programs will grow;
 - Implications for unrestricted elective time;
 - Importance of the creation of more flexible degree programs in majors that exceed the current rules.

Example: Chemistry

- Current Program:
 - 6 Sci and Math (5.111)
 - 1 Inst Lab (5.311)
 - 2 REST (5.12)
 - 13 subjects required by department (including 5.111, 5.12, 5.311)
 - Minus overlap = 10
 - Plus 8 HASS
 - Plus 5 Unrest Electives

 - Total Program = 32 subjects
- Future Program:
 - 8 Sci-Math-Eng
 - 14 subjects required by department (8.02 would be required in addition to current program)
 - Minus 5.111 and 8.02 (current allowed overlap)
 - = 12 subjects
 - Plus 8 HASS
 - Plus 5 Unrest Electives

 - Total Program = 33 subjects

Example: Chemical Engineering

- Current Program:
 - 6 Sci and Math
 - 1 Inst Lab (5.310)
 - 2 REST (5.60 & 18.03)
 - 15.5 subjects required by department
 - minus 5.60, 18.03 & 5.310 (allowed overlap)
 - = 12.5 subjects
 - Plus 8 HASS
 - Plus 4 Unrest Electives

 - Total Program = 33.5 subjects
- Future Program:
 - 8 Sci-Math-Eng
 - 17.5 subjects required by department (7.01 and 5.11 would be required in addition to current program)
 - Minus 7.01, 5.11x and 18.03 (current allowed overlap)
 - = 14.5 subjects
 - Plus 8 HASS
 - Plus 4 Unrest Electives

 - Total Program = 34.5 subjects

Example: Biological Engineering

- Current Program:
 - 6 Sci and Math
 - 1 Inst Lab (BE109)
 - 2 REST (5.12 & 18.03)
 - 15 subjects required by department
 - minus 5.12, 18.03 & BE109 (allowed overlap)
 - = 12 subjects
 - Plus 8 HASS
 - Plus 4 Unrest Electives

 - Total Program = 33 subjects
- Future Program:
 - 8 Sci-Math-Eng
 - 18 subjects required by department (7.01, 8.02 and 5.11x would be required in the program in addition to current subjects)
 - Minus 3 of 7.01, 5.11x, 8.02 and 18.03 (current rules allow overlap of 3)
 - = 15 subjects
 - Plus 8 HASS
 - Plus 4 Unrest Electives

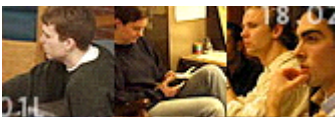
 - Total Program = 34 or 35 subjects (depending on how many subjects large programs may require)

Questions

- In large departmental programs, how many subjects should departments be allowed to specify (that is, overlap with the GIRs)?
- Should the size of the minimum unrestricted electives be reduced to 36 units (from 48)?
- Should more flexible degree programs (a la 2A and 8B) be offered as attractive alternatives to these very large programs?

Next Steps for the Task Force

- d'Arbeloff Grants: Call for proposals generated enthusiastic response from faculty across MIT:
 - *Six Project-based initiatives have been funded for Spring 2007*
 - *Three pilots for new HASS subjects*
- Final report ready by late August;
- Recommendations to the Faculty in early Fall;
- Task Force will recommend formation of a faculty implementation group (working closely with CUP).



Implications of Recommendations

- Resources:
 - What resources will MIT have to provide?
 - What resources will be needed by departments?
- Sustainability:
 - How will we be able to sustain the changes?
 - Recommendations cannot be unfunded mandates;
 - Zero-sum game
 - MIT will not be able to introduce new subjects and expect current faculty to handle it all;
 - What do we stop doing?
 - What do we improve?

Infrastructure Concerns

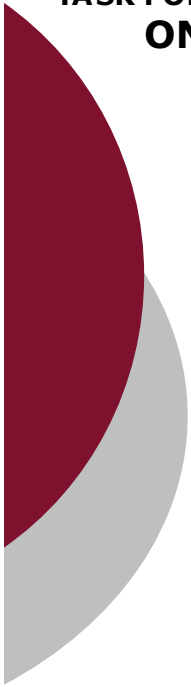
- Student Information System;
- Classrooms (e.g., for project-based classes, HASS FreshX, etc.);
- Scheduling (e.g., dedicated time slot for new FreshX classes).



Opinions or Suggestions?

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Task Force on the Undergraduate Educational Commons

Perspectives from the Student Advisory Committee



Teaching and Learning (SAC)

- Quality and style really matter;
- Strongly endorse TF recommendations;
- More can be done to engage students;
- Consistently excellent instruction in Science Core is needed;
- Greater variety in assigned work (not just p-sets);
- A more 'holistic' approach to the first year.

Advising and Mentoring (SAC)

- Advising quality is a major concern to students;
- Should be part of teaching record and tenure decisions;
- Strongly endorse Task Force recommendations;
- In agreement with SAC and UA-SCEP;
- Some students want a more accountable system.

International Experiences (SAC)

- Generally very valuable for students;
- Provide contrast to and perspective on MIT;
- Should be a realistic option for all students;
- Strongly endorse Task Force recommendations;
- Need more encouragement from departments;
- Students feel constrained by their major programs.

New Sci-Math-Eng Core (SAC)

- Balance flexibility and common experience;
- Strongly endorse project-based experiences -- should be encouraged for all students;
- Better to cut departmental requirements than constrain choice in first year;
- Faculty should encourage exploration.

HASS (SAC)

- Endorse elimination of HASS-D Requirement;
- Varied reactions to “Freshman Experience”
 - Huge opportunity, but loss of flexibility;
- Concerns about Foundational Electives (similar to HASS-D)

The MIT Learning Culture (SAC)

- Intellectual passion;
- Culture of busyness;
- Role of the Commons;
- We want your thoughts! Email edcomm-request@mit.edu;
- Join on-line discussions this summer;
- Come to forums in the Fall!