

# **Freshman Pass/No Record Grading and Advanced Placement Policy**

## **Report of a special subcommittee of the Committee on the Undergraduate Program**

The Massachusetts Institute of Technology

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## Preface

The accompanying report represents the efforts of the CUP Subcommittee on Freshman Pass/No Record Grading and Advanced Placement Policy to respond to its charge, spelled out in the letter of November 21, 1999 (See Appendix I-A), to examine these two important aspects of the freshman year at MIT.

The report itself is a bit complex in its organization, owing to the fact that the Subcommittee's charge was to examine *two* separate policy areas which needed to be considered separately and in combination. To assist in working through the report, it has been organized such that the main body of the text in each of the three parts can be read together as a cohesive narrative about the Subcommittee's findings and recommendations. The appendices in Parts II and III contain much supporting material behind these narratives. The "working parts" of the appendices include the direct answers to the questions that were put in the charge (Appendix II-A for Pass/No Record grading and Appendix III-A for Advanced Placement policy) and a direct assessment of the Pass/No Record grading system in light of the goals laid out for it in 1972 (Appendix II-B).

## Executive Summary

In the Fall of 1999 the Committee on the Undergraduate Program formed a subcommittee and charged it with reviewing MIT's policies concerning freshman Pass/No Record grading and advanced placement examinations. This summary focuses on key recommendations made by the Subcommittee after a thorough review of both of these policies.

### **Pass/No Record Findings (Section II.B., pp. 14–19)**

The current system of Pass/No Record grading for freshmen provides for an effective transition from high school to the rigors of MIT. However the benefits of this grading system diminish substantially in the Spring Term, to the detriment of the preparation of many freshmen for the rigors of the sophomore year and beyond. In addition, the current Fifth Week Flag system of identifying freshmen in academic difficulty needs to be enhanced and the status of subject prerequisites needs to be clarified.

### **Proposal to Change Freshman Grading System (Section II.C. pp. 19–25)**

*In the **second term of the freshmen year**, all first year students should be graded on the basis of A/B/C/No External record, and the term rating should be computed.* Currently, freshmen are graded on a P/NR basis in both terms. Concerns noted in the previous section, reinforced by a desire to encourage an effective *transition* into MIT, lead to a recommendation that MIT adopt an intermediate form of traditional letter grading in the Spring Term. The proposal retains the “disaster insurance” feature of the current grading system, which does not externally report performance in subjects in which a student has received a D or F. See pp. 21–22.

*A grading designation should be created to encourage students in their sophomore year to explore new intellectual areas.* Sophomores should be allowed to specify one subject during the sophomore year as an “Exploratory Subject.” At the end of the semester the subject is taken, after the final grades have been assigned for the subject, the student would be given the option of accepting the letter grade assigned *or* having the transcript status changed to “Listener,” thus forfeiting the grade and credit. The Faculty should explore whether this mechanism should replace the current junior-senior P/D/F grading option. See pp. 23–24.

*The Dean's Office should work with departments to develop additional methods to communicate in-term academic performance to students and advisors, to augment the current Fifth-Week Flag system.* Currently a Fifth Week Flag system identifies freshmen who are in danger of failing subjects, based on early indicators, and reports that information to the students and their advisors. This current system replaced an extensive narrative assessment process that was part of the original Pass/Fail system adopted in the early 1970s. Because the effectiveness of the Fifth Week Flag system is limited, the Dean's Office

should work with the Departments to develop new ways to enhance the flow of information to freshmen and their advisors about student academic performance. See pp. 22–23.

*Once the Committee on Curricula has approved a set of prerequisites for a subject, the faculty teaching that subject have the right to exclude students from taking the subject who do not satisfy the stated prerequisites.* Currently, there is uncertainty and disagreement among faculty members about the right of instructors and departments to exclude students from subjects when they have not taken the appropriate prerequisite subjects. This presents special problems in the freshman year, when a small number of freshmen are tempted to take overly-advanced subjects to “get them out of the way” under P/NR. The most appropriate way to address this problem is local. Therefore, it should be clarified that faculty members and departments can actively enforce published prerequisites. See pp. 24–25.

*Transfer students should, at most, be allowed one term of grading under the A/B/C/NR system upon their initial enrollment at MIT.* Currently most transfer students enter MIT under the traditional letter grade system, but approximately one-third are offered the option of taking one semester under Pass/No Record. Because the strongest justification for Pass/No Record grading is to aid in the initial transition from home to college, transfer students should not be offered Pass/No Record grading in the future. Only a very small number of transfer students should be offered the opportunity to take subjects on an A/B/C/No Record basis. See p. 25.

*Current policies concerning Fall Term Pass/No Record grading and the freshman year credit limit are unchanged.* The present Pass/No Record system serves its goals well in the Fall Term. Any reduction in freshman academic effort is compensated for by various academic and non-academic benefits. The credit limits should remain unchanged, even in the Spring, to assist in assessing the new grading system and to remove the temptation to freshmen to overload. See pp. 19–20, 22.

#### **Advanced Placement findings (Section III.B., pp. 54–57)**

On the whole, the current system of offering advanced placement credit to MIT freshmen is consistent with the goals of MIT’s undergraduate program. MIT’s advanced placement system allows freshmen with varying backgrounds to engage with MIT’s rigors at an appropriate level. Nonetheless, there is uneasiness on the Subcommittee about granting college credit for subject material covered in high school, and therefore the Institute and its academic units need to be especially vigilant in ensuring that its policies of offering advanced placement credit are consistent with MIT’s educational goals. In addition, faculty governance over advanced placement policy has been unclear for many years, and is in need of clarification and strengthening.

#### **Proposal to Change MIT’s Advanced Placement Policy (Section III.C., pp. 57–61)**

*Whenever advanced placement credit is granted, a score of "5" on the College Board Advanced Placement subject tests (or its equivalent on another examination) will generally be the accepted cutoff for receiving subject credit at MIT.* The Subcommittee was uneasy with granting MIT subject credit for academic work accomplished during high school. Yet a balance needs to be struck between this uneasiness and the pragmatic need to assess the prior preparation of entering students, allowing those who are appropriately prepared to move ahead earlier in their academic program. The College Board Advanced Placement subjects tests, and their equivalents, are sometimes appropriate assessment tools.

Currently, the general cutoff for MIT subject credit for performance on a College Board Advanced Placement subject exam is a "4," although departments and programs have been gravitating toward the higher threshold in recent years. Concerns over a downward drift in the performance on College Board Advanced Placement tests, combined with MIT's high academic standards, require this higher threshold as a general matter. A lower threshold may be appropriate in particular cases; departments may make such exceptions, within a set of flexible guidelines. In addition, MIT academic units are under no obligation to offer credit through advanced placement examinations. See pp. 57–58.

*Departments responsible for Science Requirement subjects may offer subject credit through advanced placement exams, so long as these examinations cover curricula that are materially the same as the corresponding MIT subjects. Changes in Science Requirement policies must be reported to the CUP.* Recognizing the distinct flavor of many Science Requirement subjects as taught at MIT, it is important that students receiving credit for these subjects through advanced placement exams be exposed to the same material that is taught at MIT. In addition, there is currently no clear policy about faculty review and oversight of advanced placement examinations administered outside MIT. The recommendation emphasizes local oversight of policy and monitoring of tests, with periodic reporting to the faculty committee that is responsible for the freshman year program. See p. 59.

*Departments responsible for subjects other than those meeting the Science Requirement or the HASS requirement may offer MIT subject credit, General Elective Credit, or subject placement, through advanced placement exams. Changes in departmental policies will be reported to the Committee on Curricula.* This recommendation parallels recommendations pertaining to the Science Requirement (above) and HASS Requirement (below), and is intended to apply to all subjects that do not fit within one of these requirements. The COC is the faculty committee responsible for approving individual subjects and changes to departmental programs, and therefore is the appropriate committee to receive these reports. See p. 60.

*The Dean of Humanities, Arts, and Social Science shall be responsible for developing and administering policy concerning the granting of HASS or HASS-D credit through examinations.* This parallels the previous two recommendations. The Rules and

Regulations of the Faculty charge the Dean of Humanities, Arts, and Social Science with the responsibility for overseeing the HASS requirement. See p. 60.

*The Registrar shall begin recording the individual examinations for which MIT undergraduates receive General Elective Credit, rather than aggregating this subject credit together in one single category.* Currently, the Registrar's Office does not record, for each student, the individual subject examinations for which students have received General Elective Credit. This makes it difficult to administer some details of the advanced placement policy and to track, at the level of the individual student, the academic trajectory undergraduates follow when they come to MIT with advanced placement credit. See pp. 60–61.

*The administrative oversight of MIT's advanced placement policy should be moved from the Admissions Office to the Office of Academic Services.* The current administrative home of advanced placement policy at MIT is a vestige of past practice, in which several faculty members were involved in the daily administration of the Admissions Office. It is appropriate for advanced placement policy to be administered by a unit of the Dean's Office that is directly responsible for curriculum and faculty committee support. See p. 61.

*Current policies concerning the granting of subject credit and placement generally, administering advanced standing exams, and allowing departments to accept advanced placement examinations should remain unchanged.* Although the Subcommittee recommends incremental changes in MIT's advanced placement policy, and a slight tightening-up of that policy, the general policy of allowing Institute subject credit is unchanged, for largely practical reasons. (See pp. 56–58.) In addition, nothing in the Subcommittee's recommendations should be construed as affecting traditional advanced standing examinations given by MIT Departments (see p. 58) or the ability of Departments to accept an advanced placement examination as evidence of the completion of a subject prerequisite, at its discretion (see p. 60).

# Part I

## Introduction

### A. Overview of Charge

In the Fall of 1999 the Committee on the Undergraduate Program formed a subcommittee and charged it with reviewing MIT's policies concerning freshman Pass/No Record (P/NR) grading and advanced placement examinations. As stated in the charge to the committee (see Appendix I-A):

Ever since its institution, faculty have expressed concern about whether the P/NR system is fulfilling the goals laid out for it. Such concerns have become more frequently voiced in recent years. Even when embracing the overall goals of the system, many faculty have begun to wonder whether a large number of first-year students have begun to "game" the first year in educationally inappropriate ways. Problems of gaming the system may be exacerbated by MIT's liberal AP credit policy, which was recently identified by the Educational Design Project subcommittee as creating "curriculum creep" throughout the four-year curriculum. Still other faculty are concerned that the P/NR system discourages a serious approach to the first year academic program, leading to first year students being lax in their studies, unprepared for more advanced work, and overly active in extracurricular activities.

With respect to the system of Pass/No Record grading, the committee was asked to respond to the following questions:

1. Are the purposes as outlined in 1972 still relevant and consistent with the goals of the MIT first year experience?
2. What are the statistical trends with respect to subject enrollments, grade distributions, average loads at the start and end of term, etc?
3. What are some alternative proposals for first year grading schemes that might be considered?
4. Should P/NR grading be limited to the Fall Term only? Are there categories of subjects that should be graded on a P/NR basis regardless of when a student takes them?
5. Should there be options available to instructors or departments to limit enrollments in subjects for students not taking subjects on grades?

6. The load limit is currently 54 units in the fall term and 57 units in the spring term. The fall term load limit has had an effect on enrollments in Freshman Advising Seminars. Should there be an adjustment or special exceptions made to these limits?
7. What are the incidences and consequences of the “gaming strategies” used by students to maximize P/NR grading?
8. How does the awarding of advanced placement credit influence student choices in the first year?

With respect to MIT’s advanced placement policy, the subcommittee was asked to respond to the following questions:

1. What do we know about students who use advanced placement credit? How do they perform in subsequent subjects?
2. What are the graduation patterns of students who are awarded AP credit? Do they graduate earlier? Do they earn multiple degrees?
3. What are the statistical trends? Are different subject enrollment or grade distribution patterns emerging? Are these observed patterns related to AP credit?
4. Should MIT continue the policy of allowing advanced placement credit? If so, should the policy be uniform across departments and Schools?
5. Should MIT’s policy governing advanced placement credit include the granting of MIT subject credit, or should we consider other options (e.g., the awarding of subject placement with no actual MIT subject credit or units; eligibility for MIT advanced standing examinations, etc.)?
6. Should students who are enrolled in predominantly second year subjects (by virtue of the amount of AP credit they have been awarded) be assigned non-optional sophomore standing?

Membership of the committee consisted of a chair selected by the Committee on the Undergraduate Program (who had previously chaired the CUP), representatives from the Committee on Academic Performance and the Committee on Undergraduate Admissions and Financial Aid, faculty with long-standing experience in teaching freshmen and from departments who teach many freshmen, a representative from the Dean for Undergraduate Education who has had considerable experience in this area, and two undergraduate students nominated by the Undergraduate Association.

## B. Methodology

During IAP and the Spring Term of 2000, the Subcommittee conducted a thorough review of the background of both of these policy areas and their current implementation. The Subcommittee met weekly during IAP and biweekly during the Spring, for a total of twelve meetings that consumed 25 hours of meeting time. The Subcommittee reviewed past reports pertaining to MIT's freshman grading system, a large number of reports and compilations concerning the academic experiences of undergraduates (grade distributions, unit loads, etc.), reports of other universities' practices, and other material. The Subcommittee also consulted with faculty and staff who had special experience with and concern for the freshman year, including members of the Dean's Office (past and present), freshman advisors, and departmental academic officers. Subcommittee members also met with the Student Committee on Educational Policy (SCEP) of the Undergraduate Association and with associate advisors. Appendix I-B lists the individuals and groups Subcommittee members met with. Appendix I-C contains a limited bibliography of the studies and data that the Subcommittee reviewed during its deliberations.

The original charge to the Subcommittee requested a preliminary report early in the Spring term and a final report later in the Spring. The significant amount of review and deliberation necessary made it impossible to meet these deadlines. A preliminary, oral report was made to the CUP on April 5, 2000. The Subcommittee met to settle on the content of its final report during Finals Week, with the bulk of the final report being drafted over the summer. The final draft of the report was approved at a meeting of Subcommittee on September 18, 2000.

## C. Principles

The freshman year, considered as a whole, is the foundation on which MIT's distinctive educational experience rests. The two policies under the Subcommittee's review, especially the Pass/No Record grading system, are integral pieces of that first year. Therefore, it was necessary to place the Subcommittee's work in the context of the overall goals of the first year. Because the Subcommittee was charged with reviewing a set of administrative practices, it was also necessary to specify the general types of practices that should be encouraged.

Four academic and two administrative principles guided the Subcommittee's deliberations and final recommendations. The four academic principles were taken almost verbatim from a set of academic principles recently articulated by the Committee on the Undergraduate Program. These principles frame the larger context of the Subcommittee's task and keep it focused on the core educational issues that are at stake.

- 1. The first year should impart a firm base of foundational knowledge on which later learning, at MIT and throughout life, will be based.** Almost all of MIT's major

programs are designed assuming that sophomores have mastered a set of academic subjects that constitute the Science Requirement. In the School of Engineering particularly, one of MIT's crowning achievements is the development of an educational philosophy of "engineering science." The most important function that grading and advanced placement policies can serve is to encourage students to master this foundational material before moving on to their majors.

2. **The first year at MIT should provide an effective transition for students, both from the secondary school setting to MIT and from the freshman year to the major departments.** The grading system and advanced placement policy should allow students to acquire the general skills and habits necessary for long-term success at MIT and to adjust to community living and the responsibilities of adulthood.
3. **The first year should encourage students to exercise their intellectual abilities to their fullest.** MIT undergraduates are admitted because they are capable of the most demanding academic achievements. Even though MIT has high academic expectations of all admitted students, our students arrive with varying degrees of preparation for handling MIT's academic challenges and varying interests in the different intellectual paths the Institute has to offer. The grading and advanced placement policies should encourage each first year student to engage with the curriculum at a level that is challenging and exciting to him or her.
4. **Students in their first year at MIT should continue to develop social skills and acumen for MIT and beyond.** The value of an MIT education extends well beyond the classroom. The residential experience at MIT provides opportunities for MIT undergraduates, who are preparing for leadership positions in society, to learn how to live with people of different backgrounds, lead a balanced life, and understand generally what is expected of responsible members of a community. The grading and advanced placement policies should encourage good habits in balancing between curricular and extracurricular commitments and positively encourage students to explore the benefits of MIT's opportunities that exist outside the classroom.
5. **There are no first- and second-class subjects at MIT.** Another distinctive feature of the MIT undergraduate education is the expectation that each student will excel in all academic areas of the curriculum—engineering, science, humanities, arts, and the social sciences. Therefore, the grading system and advanced placement policies must not systematically encouraging attention to one set of subjects at the expense of others.
6. **Educational policy must be easy to understand and administer.** There is a tendency in large organizations for rules to grow more complex. This danger is especially acute at MIT because of our great concern for the individual circumstances of students. However, accommodating the special circumstances of students by writing complex rules ultimately undermines the Institute's ability to deal fairly with students; compounds the frustration of students, faculty, and staff who must administer and abide by complex rules; adds unnecessary administrative costs and burdens; and ultimately encourages a

culture of gamesmanship. Therefore, in recommending any changes to the grading and advanced placement policies, we should strive to make those rules as simple and transparent as possible.

Finally, the Subcommittee felt it important to make explicit three broad assumptions that guided its work.

- 1. The ultimate goal of the subcommittee is to enhance the total educational experience of MIT undergraduates.** The grading system and advanced placement policy must be seen as two tools, among many, that guide freshmen in making appropriate trade-offs among competing uses of their time, establish a trajectory for their future paths through MIT, allow them to gauge the adequacy of their academic efforts, and ultimately advance them to personal success at the Institute.
- 2. MIT undergraduates work exceptionally hard.** Slacking is not a dominant characteristic of students experiencing their freshman year. The Subcommittee must make this statement up-front because of some statements heard from faculty colleagues—and from upperclass students—that suggest otherwise. The Subcommittee has encountered some evidence that a small number of freshmen actively “coast” through the first year and evidence that many students, on the margin, do not apply themselves as assiduously to their classes as they might. At the same time, the freshmen as a whole complete more subject units than upperclassmen, are much more active in extracurricular and sports activities than upperclassmen, and often do what they can to take upper division subjects without the benefit of prerequisites. Therefore, the correct concern is not over whether freshmen are working hard, but whether they are applying their vast energies appropriately and efficiently, and whether the vast majority of them are making the right set of decisions that will ensure their current and later educational success.
- 3. Any changes to the grading system need to be seen in context of other changes, currently under review, to enhance the freshman year at MIT.** Throughout the Subcommittee’s review, it encountered many criticisms of the current first year experience, from faculty and administrators, but *especially* from students. In that context it is easy to lose focus on grading and advanced placement and to wander into policy areas such as the content of the Science Requirement, the teaching approaches of first year subjects, and the efficacy of the advising system.

The Subcommittee has avoided the temptation of exploring these topics that are not part of its charge. It notes the several plans and experiments currently under way to address all the deficiencies suggested and asks that its efforts be viewed in the larger context of the renewal of MIT’s first year experience. The Subcommittee recommends some important changes in how MIT grades its freshmen and grants advanced placement credit, and stands by those recommendations regardless of how the rest of the first year experience fares. However, if these are the *only* major changes that occur

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in the current round of experimentation and reform with the first year, MIT will have missed an important opportunity.

## Appendix I-A

# Charge to the Committee

### *Background*

Since 1968, MIT freshmen have been graded under a Pass/No Record system (referred to at various times in the past as "Pass/Fail" and "Pass/No Credit"). In February, 1972, following a four-year trial period, the Committee on the Evaluation of Freshman Performance released its findings and recommendations and outlined the purposes of Freshman Pass/Fail grading:

- "to relieve the anxiety and sense of pressure felt by incoming MIT students during the year of their transition from secondary school to work in a university of high quality and high expectation;
- "to develop in each student a more mature motivation for his university education and a more active, expressive involvement in his studies; and to give him a sense of freedom to make a wider choice of subjects and a wider choice in the allocation of his time among his subjects when a topic within any one of them especially excited him. These attitudes, it was felt, might persist throughout the upperclass years.
- "to give incoming students a year in which to compensate for differences in their secondary school preparation;
- "to improve the instructor-student relationship by removing the corrupting doubt that a student approaching an instructor might be attempting to influence his grade;
- "to enrich the evaluation of student performance and experience in each subject;
- "to change the image of MIT as a school that grinds out students mechanically, a school that only 'tools' would find congenial;
- "and, lastly, to lessen the (fairly small) loss of creative students during their freshman year."

The committee acknowledged that the absence of letter grades during the pilot phase might have produced undesirable results, including students' "neglect of their studies, being content only to 'get by;' that their preparation for upperclass subjects might thereby suffer; that the absence of information about how well they were doing...might create anxiety for some students; and that the absence of letter grades...might cause some difficulty in the placement of students in graduate schools, professional schools, or jobs." On balance, however, the committee concluded that the experimental grading system was a "definite improvement" to the freshman year and recommended that it be continued indefinitely.

In the years since the original experiment, faculty committee records chronicle regular discussions of issues related to freshman grading and attempts to address them. In 1982, there was concern about the effectiveness of the performance evaluation system and the virtual lack of feedback by the end of the spring term; formal "hidden grades" for the Spring Term were introduced. In 1988 - in an attempt to address the heavily-packed first year core program -- a faculty committee tried to eliminate universal P/NR grading in the second term. An alternative motion was substituted instead that changed the Pass level from a "D" to a "C" grade, and the credit limit was lowered. In 1995, the old Freshman Performance Evaluation Forms were eliminated, substituted with a simpler but less universal system, and "hidden grades" were formalized for the Fall Term.

#### *Charge to the Subcommittee*

Ever since its institution, faculty have expressed concern about whether the P/NR system is fulfilling the goals laid out for it. Such concerns have become more frequently voiced in recent years. Even when embracing the overall goals of the system, many faculty have begun to wonder whether a large number of first-year students have begun to "game" the first year in educationally inappropriate ways. Problems of gaming the system may be exacerbated by MIT's liberal AP credit policy, which was recently identified by the Educational Design Project subcommittee as creating "curriculum creep" throughout the four-year curriculum. Still other faculty are concerned that the P/NR system discourages a serious approach to the first year academic program, leading to first year students being lax in their studies, unprepared for more advanced work, and overly active in extracurricular activities.

MIT's system of freshman P/NR grading exists to further the overall goals of the first year experience; any review of that system should be carried out with those goals in mind. Those goals have recently been re-articulated by the CUP and are provided in an attachment to this charge.

With respect to Pass/No Record grading in the first year, the subcommittee should address the following questions:

- Are the purposes as outlined in 1972 still relevant and consistent with the goals of the MIT first year experience?
- What are the statistical trends with respect to subject enrollments, grade distributions, average loads at the start and end of term, etc?
- What are some alternative proposals for first year grading schemes that might be considered?
- For example, should P/NR grading be limited to the Fall Term only? Are there categories of subjects that should be graded on a P/NR basis regardless of when a student takes them?

- Should there be options available to instructors or departments to limit enrollments in subjects for students not taking subjects on grades?
- The load limit is currently 54 units in the fall term and 57 units in the spring term. The fall term load limit has had an effect on enrollments in Freshman Advising Seminars. Should there be an adjustment or special exceptions made to these limits?
- What are the incidences and consequences of the "gaming strategies" used by students to maximize P/NR grading: e.g., taking upper-level subjects prematurely and/or without the proper prerequisites; overloading to the detriment of mastery of material; declining sophomore standing when eligible and ready, etc. How does the awarding of advanced placement credit influence student choices in the first year?

With respect to MIT credit earned for work done prior to matriculation ("AP Credit"), the subcommittee should address the following additional questions:

- What do we know about students who use advanced placement credit? How do they perform in subsequent subjects?
- What are the graduation patterns of students who are awarded AP credit? Do they graduate earlier? Do they earn multiple degrees?
- What are the statistical trends? Are different subject enrollment or grade distribution patterns emerging? Are these observed patterns related to AP credit?
- Should MIT continue the policy of allowing advanced placement credit? If so, should the policy be uniform across departments and Schools?
- Should MIT's policy governing advanced placement credit include the granting of MIT subject credit, or should we consider other options (e.g., the awarding of subject placement with no actual MIT subject credit or units; eligibility for MIT advanced standing examinations, etc.)?
- Should students who are enrolled in predominantly second year subjects (by virtue of the amount of AP credit they have been awarded) be assigned non-optional sophomore standing?

The subcommittee should feel free to range beyond these topics to fully explore the issues. Early in the second term, you will be asked to provide an interim report; a final report to CUP will be expected in late Spring.

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## Appendix I-B

### Individuals and Groups the Subcommittee Met With

#### *Individuals*

Prof. Paul Gray  
Dean Marilee Jones  
Prof. Travis Merritt  
Dean Leo Osgood  
Prof. Arthur Steinberg  
Dean Bonnie Walters

#### *Faculty groupings*

Academic Officers in Math, Physics, Chemistry, Materials Science and Engineering, and  
Biology  
Committee on the Undergraduate Program  
Freshman Advisors  
Freshman Core Lecturers  
HASS Overview Committee  
Physics Education Committee

#### *Student groups*

Associate Advisors  
Student Committee on Educational Policy of the Undergraduate Association

## Appendix I-C

### Limited Reference List

#### *Background reading*

1. *A Brief History of First Year/Pass No Record Grading*
2. *Further Information for Freshmen Regarding Pass-Fail* (August 1, 1968)
3. *Report to the Faculty on the Four Year Trial of Freshman Pass/Fail Grading* (February 11, 1972)
4. *CEP Recommendations on the Freshman Year* (September 22, 1982)
5. *Report from the Committee on the First Year Program* (May 16, 1988)
6. *Motion . . . on P/NR Grading* (May 3, 1989)
7. *Policy on the Release of First Year Student Internal Grades* (May 1995)
8. CUP Meeting Notes (April 3, 1996)
9. Two excerpts from the Preliminary Report of the Educational Design Project (August 1999)
10. *Survey of Advanced Placement Credit Policies at Other Schools* (Fall Term 1999)

#### *Additional data gathered for this task*

11. Excerpts from Physics Department interview with students after they had taken 8.01 (comments pertaining to the effects of the grading system on performance)
12. Percentage of enrolling freshman class in each academic index column and personal index column (data from 1959–1999)
13. Hours per week spent on MIT subjects, as reported in the Spring 1999 and Fall 1999 Subject Evaluation Guide
14. Preliminary data from the 1999 “Looking Back at Freshman Year” Survey of Sophomores
15. Cumulative Grade Distributions in 6.001, by Freshman/~Freshman status
16. “The Undergraduate Program at Other Universities” (Prepared by Prof. Tom Greytak, September 1997)
17. “Advanced Placement and Degree Credit at Entrance for September 1999” (Admissions Office Brochure)
18. “Profile of the Freshman Year” (10 December 1985)
19. “MIT Undergraduate Education: A Statistical Sketch of the Class of 1991” (August 1991)
20. “Profile of Freshmen Entering Fall 1994” (January 1999)
21. “Comparison between 1995 and 1999 Freshman-Year Surveys” (February 2000)
22. “1999 Survey of Freshman Year 1998-99” (February 2000)
23. “The Academic Careers of Freshmen Placed on Academic Warning during Their First Year” (March 2000)
24. Grade distribution data of various sorts

# Part II

## Pass/No Record Grading

### A. Policy Background

The MIT faculty adopted a Pass/Fail grading system for freshmen as an experiment in 1968, making it permanent in 1973. Important changes occurred in Fall Term 1990, when the bar for receiving a P was raised and the credit limit was lowered, and 1995, when narrative evaluations of all freshmen were abandoned in favor of a more limited “Fifth Week Flag” of freshmen in danger of failing.

As currently written, the *Regulations of the Faculty* (section 2.63) contain five grading provisions that apply specially to first-year undergraduate students:

1. The only passing grade permanently recorded by the Registrar is P.
2. The non-passing grades of D, F, O, and OX are recorded by the Registrar for use *within the Institute only* and do not appear on official Institute transcripts.
3. At the beginning of the sixth week of each term, instructors of first-year students notify in writing those students performing at a non-passing level that they are at risk of not passing the subject.
4. At the end of each term in the freshman year, letter grades (if assigned) equivalent to the letter grades assigned to upper-class students are provided to freshmen through their freshman advisors. Freshman letter grades may not appear on students’ official internal grade reports or external transcripts and are used in accordance with guidelines established by the Committee on the Undergraduate Program.
5. First-year undergraduates may register for and receive at most 54 credit units in the fall term and 57 credit units in the spring term (excluding ROTC credit units).

Until the 1960s all MIT freshmen essentially took the same subjects, which were assessed using traditional letter grades. Responding to numerous forces for change, the Institute altered both its freshman curriculum in the 1960s and the method of assessing freshmen. The decision to consider abandoning letter grades for freshmen arose for many reasons, but an important one was related to the great changes that overtook education in the United States following the Sputnik launch in 1957. In the aftermath of that crisis, science education in high schools was significantly improved, resulting in a rapid improvement in the abilities of entering MIT students to excel in the Science curriculum. This posed a problem for the assessment of freshmen, since faculty felt compelled to retain some distribution across the entire letter grade range, yet those distinctions turned out to be

harder and harder to justify. This difficulty, in turn, had the predictable negative consequences for student morale.

This improvement in the high school preparation of entering MIT students also interacted with general attitudes in society at that time—a time that emphasized freedom of exploration over conformity, and a time in which major institutions such as MIT were attempting to increase the class, racial, and sexual diversity of their student bodies. These developments put pressures on MIT's freshman year and, in turn, on its grading policies.<sup>1</sup>

The pressure on the grading policy was resolved through a reform of the freshman grading system that began on an experimental basis in 1968. In that year the MIT faculty voted that all freshmen entering in September 1968 would be graded on a Pass/Fail basis. That is, the grade of P or F would be recorded for freshmen in all subjects taken by them. The Committee on the Evaluation of Freshman Performance (CEFP), which was established to monitor the experiment, decided initially to impose a credit limit of 51 units, which was quickly raised to 54 units and then abandoned.

The experiment was scheduled to end in 1972, but the faculty voted to continue it for one more year. In 1973 the reform was made permanent, with one important change—the system was changed from Pass/Fail to Pass/No Record, meaning that failing grades were no longer recorded on the external transcript.

In releasing its 1972 report on the Pass/Fail experiment, the CEFP articulated certain hopes and fears associated with the system when it had been adopted in 1968. Responding to those hopes and fears form an important feature of the Subcommittee's charge. An assessment of the current Pass/No Record system in light of most of these hopes and fears is provided in Appendix II-B.

In 1982 the Committee on Educational Policy (CEP) released its *Recommendations on the Freshman Year*, which included support of two terms of Pass/No Record grading; improving feedback to freshmen and their advisors in the form of improvements to freshman performance evaluation; retaining the existing load limits (60 and 63 units in Fall and Spring) but urging that the "normal" load carried be 45 to 54 units; improving communications through better information and advising; and establishing the practice of reporting "hidden grades" in the Spring term to advisors.

In 1988 the Committee on the First Year Program, chaired by Professor Kenneth Manning, recommended a more "flexible" first year program and recommended changes in

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<sup>1</sup>It is sometimes supposed that the decision to abandon letter grades for freshmen was directly tied to decisions made at MIT in the late 1960s and early 1970s to expand the number of women and minority students admitted, supposing that these students needed special assistance in the transition to the rigors of MIT. Our review of the timing of policy changes pertaining to the admissions process and the change of the freshman grading policy have convinced us that the two phenomena were not causally linked.

Pass/No Record grading to promote those ends. The faculty heard a recommendation that mandatory Pass/No Record grading in the second semester be eliminated; a passing grade be C or higher and no credit be given for any grade lower than C; students be allowed to take one subject per semester after the first semester on this pass/no credit basis; and junior/senior pass-fail option be eliminated.

In 1989 the Manning Committee recommendations were met with heated debate on the floor of the Faculty Meeting. A substitute motion was made to amend the CUP motion, as follows: that the grade of Pass for freshmen in both terms denote C or better performance; the unit limits be changed to 54 in the Fall and 57 in the Spring; and the junior-senior P/F option be changed to Pass/D/F. These changes were put into effect beginning in the Fall of 1990.

In 1995 the twice-a-term written feedback system that had accompanied Pass/No Record grading since its inception was eliminated by a vote of the Faculty. It was substituted “by a process focused solely on freshmen performing at the non-passing level . . . consisting of a written notification to students . . . at the beginning of the sixth week of the term.” This motion was approved, along with a motion to provide first term freshmen and advisors with a copy of their “hidden grades.” The faculty also endorsed the practice of a “Freshman Watch,” that is, quiz checks throughout the term with reports to advisors about freshmen in trouble.

## B. Findings

The CUP charge to the Subcommittee posed eight questions to guide its deliberations. Direct answers to those eight questions are found in Appendix II-A.

Most critical to assessing the effectiveness of Pass/No Record grading is understanding how that grading system contributes to, or detracts from, the goals of the freshman year as understood by the MIT faculty. In undertaking that review it is clear that Pass/No Record grading is intended to address directly one of the most important of those goals—providing an effective transition from secondary school to MIT. Part of that transition is common to most adolescents who leave home and go to college. By leaving home and coming to college, freshmen are thrust into a largely new experience in which they must learn quickly how to handle the responsibilities of young adulthood. Yet part of this transition is also unique to MIT itself. Freshmen at the Institute enter into one of the most demanding academic environments in the world. It is also an unusual academic environment among its peers, since for undergraduates it is based on a common core of knowledge in fundamental science that undergirds almost all major programs.

Therefore, in assessing whether Pass/No Record grading provides for an *effective* transition, we need a clear vision of what that transition should lead to. In addition, we need

a clear vision of the paths that MIT freshmen tread before they arrive at the Institute, so that we can understand whether the rate of transition is too steep or gradual.

MIT freshmen come from a diversity of academic and social backgrounds. Academically, MIT freshmen now come from a wider variety of high school experiences—more private schools and more magnet schools than before, and fewer traditional public schools. At the same time, the rating system used by the Admissions Office to rank applicants has tracked a significant increase in the academic quality of the admitted pool over the past decade. Hence, variance in the level of overall academic preparation for the rigors of MIT is less than it was ten or twenty years ago. At the same time, social diversity—most easily marked by the racial, ethnic, and sexual composition of the undergraduate population—has grown markedly over the past generation, as have the career and academic aspirations of incoming students. Therefore, a transition time from high school to MIT is still very much needed, even though the precise contours of that need have changed.

The heterogeneity of high school preparation is a factor that both students and faculty must contend with, even when the vast majority of admitted students arrive ready to “hit the ground running.” Longstanding evidence at the Institute suggests that, with very few exceptions, students who are admitted to MIT with deficiencies in their backgrounds quickly catch up and are as successful as those who come from privileged backgrounds. Providing a relatively low-pressured environment in which such catching up can proceed—in a way that does not stigmatize students needing a little extra preparation—is unquestionably valuable.

Central to achieving the goal of providing an effective transition from high school to MIT is the desire to reduce the anxiety and pressure many freshmen feel when they first arrive on campus. Relief of anxiety and pressure associated with the first year at MIT is a goal that is served well by the Pass/No Record system. This is the most frequently-mentioned reason why undergraduates support the current system, and is a supporting reason mentioned by many faculty and administrators, too. Not only is this relief of anxiety and pressure appreciated in its own right, but it is widely recognized that first year students take advantage of the lessened academic pressure to explore a wide variety of extracurricular activities.

Faculty are virtually unanimous in agreeing that this effect is good and succeeds in the Fall. Many faculty express regret in the culture of gamesmanship that infects the system as it plays out in the Spring. This gamesmanship compromises the level of academic focus in that term, ultimately degrading the overall educational experience of many freshmen.

One issue that has been underappreciated in the concern over transition from high school to MIT is the next transition step, from freshman year to sophomore year. Because of the way Pass/No Record is structured, sophomores face two daunting transitions—to

grades and into departments. What is referred to as the “sophomore wall” undoubtedly comes about from the confluence of these two pressures. This transition is one that many faculty and administrators have struggled for many years to understand, with limited success. The Subcommittee reached no major breakthroughs on this subject. However, the Subcommittee encountered many faculty who voiced concerns that the lower level of pressure associated with the freshman year encouraged complacency among some students that then interfered with their academic performance in the sophomore year.

This concern over the transition into the sophomore year introduces the primary academic goal of the freshman year—providing a foundational knowledge in science for subsequent work at MIT—and the performance of the Pass/No Record grading system in light of that goal. A comprehensive review of the grading system suggests that Pass/No Record grading helps to fulfill this goal in many ways. When students speak of the uncertainties they face when first coming to MIT, and of the value of Pass/No Record grading in helping them overcome those uncertainties, they are testifying to the academic assistance that the grading system lends in helping students learn by removing the distractions of self-doubt.

There is also broad evidence that the current grading system eventually undermines a mastery of fundamental material. In one sense it must do that, at least a little. Yet a small sacrifice in academic mastery may be a price worth paying if it leads *in the long run* to a better-prepared and more confident student. Still, the less the Pass/No Record system functions as an innocent safe haven for student adjustment and the more it functions as a system that actively encourages inattention to studies, the more it becomes an active tool for deflecting away material that must be mastered before going on to the sophomore year. And when that happens, the short term costs of the grading system do not exceed its long term benefits.

Concern over the negative incentive effects on the mastery of fundamental material is frequently voiced by instructors who teach Science Requirement subjects and by those who teach the principal “portal subjects” in the majors. Many Science Requirement subject instructors testify to subtle games played by students to “get by” on less than full effort. These strategies seem to proliferate in the Spring Term especially. Many instructors in introductory major subjects lament that they must spend too much time reviewing material that should have been mastered in the freshman year.

In searching for more systematic evidence that freshmen are devoting less attention to their studies than they should, the Subcommittee examined a significant volume of data concerning grade distributions and the allocation of time by students to their subjects. (A more comprehensive view of some of these data is provided in the discussion in Appendix II-A, Answer 2 on page 27.) None of this data is perfect, but viewed in its entirety, it provides a useful and consistent view of the freshman year. Freshmen devote themselves to a number of academic and extracurricular pursuits at a level no less than upperclassmen,

often exceeding upperclassmen. Freshmen devote considerable time to their studies, but the average amount of time spent on Science Requirement subjects is significantly less than time devoted to other subjects. The end result is that the average GPA of freshmen is lower for freshmen than for upperclassmen—3.8 vs. 4.1 in recent years.

Therefore, the Subcommittee's view of the effects of Pass/No Record grading is one of concern, not alarm. Nonetheless, one does not need to be alarmed at the current state of the freshman Pass/No Record system to believe it must be changed. Instead, because the negative effects of the current Pass/No Record system are often diffuse, it is necessary to craft careful reforms that are proportionate to the problems at hand.

The Pass/No Record system should be continued, and strengthened in the Fall Term. However, a more effective transition from Orientation Week to sophomore year is needed, as is more encouragement for freshmen to develop academic momentum in their Spring Term. Therefore, the Subcommittee also recommends that freshmen be graded on a modified letter grade basis in the Spring—A/B/C/No Record. This system would be intermediate between the Pass/No Record system of the Fall Term and the regular letter grade system that begins in the sophomore year.

Finally, the Subcommittee also recommends three more changes to current policy intended to assist the transition into the MIT academic environment and to enhance academic performance—an enhancement to the current Fifth Week Flag system, the creation of the designation of "Exploratory Subjects," and a clarification of the role of prerequisites.

The current Fifth Week Flag system of identifying freshmen who are in danger of failing individual subjects should be enhanced. The original Pass/Fail system replaced letter grades for freshmen with a system of narrative evaluations of all freshmen by instructors. This system brought mixed reviews, and was abandoned in 1995.

On the positive side, faculty and students recognized that the narratives, when done, provided a much greater depth of evaluation than was possible with letter grades. Also, the system involved evaluations given twice each semester, at mid-term and at the end. The mid-term evaluations were especially useful in nudging students back on track or in encouraging students who underappreciated their own efforts. The narrative provided a useful moment of *self*-evaluation for freshmen, who were required to initiate the process with a narrative evaluation of their own performance in each subject. Advisors found the system useful because of the richness of the feedback.

On the negative side, faculty found the system imposed an onerous administrative burden, especially on faculty teaching large lecture subjects. Many students neglected their duties to the system, too. Therefore, not all the forms were filled out, and the system left many gaps.

Replacing this system in 1995 was the current Fifth Week Flag, which identifies students who are in danger of failing and communicates this fact to them and their advisors. This has proven to be an efficient and effective system, but it is limited. At the time the Fifth Week Flag was written into the Rules and Regulations of the Faculty, the Faculty also endorsed the idea of a Freshman Watch, which was intended to provide information to advisors about the ongoing performance of their freshmen during the term. Unfortunately, the Freshman Watch idea was never implemented. The failure to communicate with students who are doing better than failing but who could easily fall into that category and the failure to provide regular information throughout the term to advisors are limitations of the current system.

The second additional recommendation is the establishment of an “Exploratory Subject” designation that may be used by sophomores. To help facilitate the transition into majors or the exploration of entirely new subject areas, sophomores should be allowed to designate one subject during the sophomore year as an Exploratory Subject. An Exploratory Subject would have to be so designated by Add Date. At the end of the term, the sophomore would then have two choices. He or she could accept the grade received in the subject, or he or she could convert the subject to “Listener” status.

This recommendation is intended to respond to a common concern the Subcommittee heard voiced—that students need some flexibility within the grading system to allow them to explore new areas. The freshman year Pass/No Record grading system (and the proposed A/B/C/NR system) allow for this in the freshman year, and the P/D/F option for juniors and seniors allows it in these two years. Yet there is no exploratory grading option in the sophomore year. This is a serious shortcoming of the current grading system, since sophomore year is when most undergraduates begin exploring majors, often declaring majors in departments in which they have never taken classes. In addition, many sophomores adopt an overly cautious strategy in selecting their subjects, wanting to avoid novel and unusual subjects while they are adjusting to grades. Therefore, it seems reasonable to create a small amount of “pass/fail insurance protection” for sophomores, to allow the completion of the transition to MIT that begins in the freshman year.

However, simply extending the junior-senior P/D/F option back one year or the freshman A/B/C/NR system forward one year seem to be inappropriate strategies for achieving the desired result, which is exploration across a wide swath of the curriculum. Because the junior-senior P/D/F option may not be applied to subjects required for the major or to GIRs, the amount of exploration it might foster is restricted to a very narrow range. Because so few MIT students actually fail their subjects, the A/B/C/NR option would seem functionally no different than regular letter grades.

The Exploratory Subject idea is attractive because it provides a way for students to explore in any area of the Institute they are interested in, including majors, while simultaneously allowing them to remove from the transcript a letter grade that the student finds unsatisfactory, for whatever reason. Exercising the “Listener Option” of this proposal

has significant consequences for students, however, and therefore would not be exercised lightly. Most importantly, if the Exploratory Subject were required for a major, it would be necessary to take that subject again for a letter grade before the requirement could be fulfilled. The same would of course apply to subjects needed to fulfill one of the GIRs. Therefore, the principle of fundamental mastery of foundational material could be maintained.

The final additional recommendation is that the function of prerequisites be clarified. Many faculty have voiced concerns that the Pass/No Record system encourages undergraduates to take difficult subjects in the freshman year, before they have taken the prerequisites for those subjects. In reviewing the evidence about this problem (See Appendix II-A, Answer 7, on page 33), the Subcommittee concluded that the lack-of-prerequisite problem is not a general one of the freshman year, although it does create significant localized problems.

An example of such a localized problem occurred in Spring 2000, when 64% of the freshmen who enrolled in 6.002 did not have the prerequisites listed for the subject (18.03 or 18.06 plus 8.02). Reports from the instructor in 6.002 indicate that these freshmen had significantly greater difficulty than those who had already completed the prerequisites. It may be necessary to restructure, and in effect "dumb down," 6.002 in the future if this trend continues, so that it will not be a demoralizing experience for both instructors and students.

The Subcommittee is aware that many faculty are uncertain about what they are allowed to do when a student attempts to take a subject without having taken the published prerequisite. Therefore, it is important to state clearly that faculty members are within their rights to exclude from their subjects students who have not fulfilled the published prerequisites. The Registrar's Office has operated a pilot program with the Physics Department over the past year to identify students who enroll in certain Physics subjects without the appropriate prerequisites. These students are then removed from the class list. This sort of administrative mechanism should be extended to all faculty members who desire such assistance. However, it also appears that the Registrar's Office will need increased resources if it is to extend this capability to more subjects.

### C. Proposal to Change Freshman Grading System

The subcommittee recommends the following features for a new freshman grading system. The recommendation is made following a review of various alternative proposals, which are listed in Appendix II-C, on page 50.

- 1. In their first term at MIT, all freshman students are graded on a Pass/No External Record basis. The grades of D and F are non-passing grades. An internal record of all**

**hidden grades is maintained by the Registrar; copies of this record are provided to each student and advisor at the end of term.**

This continues the current Pass/No Record system in the Fall Term of the freshman year. The nomenclature is slightly different, to emphasize that there is no *external* record of letter grades, although internal records are kept and made available for appropriate internal purposes.<sup>2</sup> This is a nomenclature change, not a change in actual current practice.

Some faculty members have proposed *abolishing* the Pass/No Record system in the Fall Term of the freshman year. The Subcommittee urges strongly against this proposal. It would subject entering students to unnecessary stress and discourage many from exploring the rich offerings of MIT outside the classroom. There is certainly a cost that is paid by some freshmen not applying themselves fully in the Fall Term. That cost is compensated for by the reduced academic pressure, which improves the performance of some students, and the latitude given students to explore in that first term.

## **2. Freshmen continue to be graded on a Pass/No External Record basis during the January IAP.**

Again, this continues the current policy, making it clear that IAP is included, for two reasons. First, several versions of Science Requirement subjects now begin in the fall, and finish (and therefore are graded) during IAP. For subjects that begin in IAP and are completed in the second term, second term provisions (see below) apply. Second, IAP is an especially appropriate time for explorations at MIT, and therefore allowing freshmen to remain on

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<sup>2</sup>The following points summarize the policy governing the use of internal freshman grades, as approved by the Committee on Educational Policy in 1985:

1. First-year internal grades may not be used in ways which would prevent students from enrolling in the department of their choice.
2. MIT will not send copies of the internal grades to third parties. It is not consistent with the purpose of internal grades for faculty or staff members to release them except to the student, or to take initiatives such as suggesting that students provide first-year grades to third parties.
3. No MIT office or individual should provide information directly to a graduate school, company, or any other third party concerning assigned internal grades—by phone, in writing, or by transmitting the unofficial report of the student's internal grades. If the student requests it, a letter, addressed to the student, will be prepared by the department which gave the subject, that will inform him or her of the assigned internal grade that is in the file. (The one exception to the above is that students applying to medical school may request that their letters be sent to the Preprofessional Advising Office for forwarding to medical schools they designate.) It is hoped that students' use of internal grades for other than intended purposes can be reduced to the lowest level possible.
4. Internal grades can be used within MIT for advising functions, that is, helping students make academic choices. It is inappropriate to use internal grades for "evaluating" students, that is, making comparisons leading to choices among students, such as selections for student employment or UROP.

The Subcommittee endorses the spirit of these policy guidelines and notes that they will need to be updated in light of the proposed new freshman grading policy.

Pass/No Record during January seems like an appropriate inducement to encourage them to take advantage of it.

- 3. In the second term of the freshman year, all first year students are graded on the basis of A/B/C/No External Record. That is, the passing grades of A, B, and C are recorded on the student's permanent record, but the non-passing grades of D and F are not. Passing grades assigned in the second term will be used in calculating a student's cumulative grade point average.**

The Subcommittee recommends that MIT adopt a modified version of letter grading in the Spring. The principal modification is that letter grades of D and F are not recorded on the external transcript, although they are recorded on internal grade reports.

The principal reason for recommending a change that moves Spring Term grading in the direction of letter grades is a belief among the Subcommittee, supported by feedback from faculty members who teach a large freshmen subjects, that the lack of letter grades encourages poor academic practices among a significant number of freshmen. The principal reason why the Subcommittee did not recommend moving to a pure letter grade system in the Spring is that the Subcommittee wanted to retain certain “disaster insurance” features of the current grading system into the second term, while at the same time creating a smoother transition to the second year grading system.

One concern about the Subcommittee's proposal is that it may induce some inappropriate gaming among students who are performing at a C, or even a B, level. There may be temptations to “punt” final exams or other end-of-term exercises, in the hope of receiving no record on the external transcript, rather than a C. However, other features of this proposal should help guard against widespread behavior of this sort. In particular, students who fail a Spring Term subject would, in most cases, end up taking that subject again on an even purer form of the grading system. Furthermore, because most of the subjects taken in the freshman year are needed for graduation or for expeditious progress in a major, the Subcommittee suspects that most students would rather receive a low passing grade in the Spring Term of the freshman year rather than significantly delay their graduation from MIT.

Because some students may discover creative and unanticipated ways to manipulate Spring Term grading under this proposal, the freshman grading system should be reviewed again after four years of operation, in AY 2006–2007.

The Subcommittee had originally considered omitting freshman letter grades from the calculation of grade point averages, since the grades reported externally are truncated at C. However, upon further reflection the Subcommittee decided to make the current recommendation, for simplicity's sake. First, the appearance of letter grades on transcripts

without them being factored into GPAs will be confusing to many outside MIT who read our transcripts. There would obviously be an explanation of this practice in the fine print of the official transcript, but we suspect the fine print would not often be read. Second, the Subcommittee is aware of a common practice in which graduate admissions committees recalculate GPAs based on all letter grades showing on a transcript. Therefore, others are likely to use freshman letter grades for the computation of GPAs even if the MIT Registrar does not.

This proposal will cause GPAs to be biased upwards somewhat, owing to the fact that freshman D's and F's will not be factored in. However, the bias will be small and diminish across the time a student is at MIT.

**4. The term unit limits will continue to be 54 in the Fall Term and 57 in the Spring.**

The Subcommittee considered both reducing the credit limit (in both terms) and eliminating it in the Spring. In the end, the Subcommittee feels that it is important to leave the credit limits unchanged for both terms, for three reasons.

First, the credit limit is an important institutional feature that the MIT faculty use to encourage freshmen to explore extracurricular activities. Even if MIT freshmen are subjected to letter grades in the Spring, they will still need to explore options outside the classroom. Second, exposing freshmen to grades but keeping the credit limit in place seems an appropriate strategy as students learn to make appropriate academic choices.

Third, in the spirit of experimentation, it is important to make only one major change to the freshman grading system at a time. The more important change to make at the moment is to introduce letter grades in the Spring. If, after a few years of experience with letter grades, the faculty wants to revisit the issue of the credit limit, they can do so. Furthermore, MIT faculty and administrators will need to monitor the effects of the grading reform over the next several years. It would be unfortunate if estimates of the effects of moving to letter grades were confounded with the effects of changing the credit limit.

**5. The Dean's Office should work with departments to develop additional methods to communicate in-term academic performance to students and advisors, to augment the current Fifth-Week Flag system.**

The Fifth Week Flag system was implemented following the vote of the Faculty in 1995 to abolish the narrative freshman assessment system then in place. This substitute performance evaluation process focuses solely on students performing at the non-passing level relatively early in the term. At the time the Faculty approved the flag regulation, they also endorsed a Freshman Watch process as a complement to the Fifth Week Flag, wherein

the freshman advising office would provide frequently-updated information to advisors about the performance of their freshman advisees in quizzes throughout the term. However, the Freshman Watch system was abandoned shortly after the Faculty vote because of the difficulty in obtaining information from the various academic departments. As an unfortunate result, the amount of information provided to advisors about their advisees' performance throughout the term was severely diminished.

The Freshman Watch idea remains a valid and necessary concept in a Pass/No Record grading environment. The Dean's Office should work to improve upon the information that is made available to advisors about their advisees' performance during the semester by taking advantage of the numerous electronic tools that might be employed (and thus avoiding the burdensome task of collecting performance data manually). For example, an "electronic grade book" might be developed for the MIT environment so that quiz grades, and even brief narrative comments, might be easily shared with advisors.

Because of its broad responsibility for administering the first year experience, it is appropriate for the Dean's Office centrally to take the leadership role in developing these new strategies and by working with departments to find ways to share this information quickly and easily. The importance of enhancing the information that is available to advisors about their advisees' performance is great enough that this is one area where the Dean for Undergraduate Education might profitably invest new resources.

- 6. Undergraduates will be allowed to designate one "Exploratory Subject" in the sophomore year. Exploratory subjects may be designated either term, but must be designated before Add Date. At the end of the term in which an Exploratory Subject has been taken, the student will then have the choice of accepting the grade received, along with the credit, or re-designating the subject so that "Listener" status is indicated, in which case the grade and the credit are forfeited.**

The general tenor of the preceding recommendations in this part of the report is to increase the academic demands on a significant fraction of freshmen in the Spring Term. Yet it would not be within the spirit of the Subcommittee's deliberations only to reduce student flexibility in their early years at MIT. Rather, the spirit of these deliberations was searching out ways to providing a more gradual transition into the rigors of the Institute. Having raised the demands in the freshman year, it is wise to introduce additional flexibility in the sophomore year.

Therefore, the Subcommittee recommends creating the designation of the Exploratory Subject in the sophomore year. The Subcommittee originally considered other grading mechanisms to achieve the goals of this recommendation. These included extending the junior-senior P/D/F option back into the sophomore year, extending the second-term freshman year A/B/C/NR system forward into the sophomore year, and modifying the junior-

senior P/D/F option so that it could be applied to any subject (including those required for majors) in the sophomore year.

The current proposal seems superior to all of those when juxtaposed against the goals and principles identified at the outset. It supplies a small but significant inducement to explore while not undermining the need to ensure a high level of competence in fundamental subjects that form the basis of later academic work.

Even with the positive benefits that would follow from this proposal, the Subcommittee can imagine some negative consequences that might follow. Among these are (1) the possibility that the process of changing the designation of subjects at the end of the term to Listener status may prove administratively complicated and (2) the possibility that the Exploratory Subject designation may encourage sophomores to overload. Trends associated with the usage of the Exploratory Subject designation should be monitored closely after its implementation, to gauge the degree to which negative consequences such as these are encountered.

- 7. Once the Committee on Curricula (COC) has approved a set of prerequisites for a subject, the faculty teaching that subject have the right to exclude students from taking the subject who do not satisfy the prerequisites. The Registrar's Office will work with faculty members to create a system that readily identifies students who do not have the prerequisites in advance of the student's first day in that class and which prevent that students' registration in that class.**

One of the most persistent and vexing problems we heard from faculty was the tendency of some freshmen to take advanced subjects, without the appropriate prerequisite subjects. This is a frustrating problem because there appears to be an obvious, localized solution to it: create mechanisms that allow faculty members and departments to enforce the prerequisites as published in the *Bulletin*. Indeed, some faculty and departments (notably Physics) have actively enforced published prerequisites and have worked with the Dean's Office to automate that practice. Still, some faculty members express confusion over whether they are allowed to exclude students who have not taken the prerequisites listed for their subjects. Indeed, there are a variety of opinions among the faculty about whether prerequisite subjects should be enforced or whether they are merely guidelines.

Having in class a large number of students taking a subject who have not taken the prerequisites can be seriously disruptive to the goals of that subject and to the learning experience of those students who have the proper background. Therefore, faculty must be able to enforce prerequisites.

At the same time, MIT has a long tradition of encouraging students to challenge themselves academically, which sometimes means taking subjects that are a little "too

advanced." It may be appropriate, in a limited number of cases, for students without prerequisites to take a subject nonetheless. There are already allowances for such students. First, individual faculty members should be flexible enough in granting exceptions to this rule when they are convinced that a student can handle the material in the class. Second, the COC approves the proposed prerequisites, and can use that authority to ensure that faculty members and departments are not introducing arbitrary restrictions. (In a similar vein, the COC can use its authority to ensure that instructors do not go *beyond* the prerequisites in keeping students out of their subjects arbitrarily.) In the end, however, it is the responsibility of faculty members teaching subjects to judge whether a student who has not taken a prerequisite is prepared to take the subject. And it is appropriate for the instructor in charge of a subject to have the authority to restrict enrollment in that subject, up to and including denying a student permission to register for the subject.

**8. Transfer students will, at most, be allowed one term of grading under the A/B/C/NR system upon their initial enrollment at MIT. Transfer students will not be offered the option of Pass/No Record grading.**

Transfer students, who in Fall 1999 numbered 25, are an important special case to discuss as MIT changes its grading system for freshmen. Typically the Dean's Office offers to about one-third of transfer students the option to take the first semester's subjects Pass/No Record, occasionally even assigning "freshman status" to a transfer student whose case is exceptional.

Transfer students have already experienced the most significant transitions from home to college before they arrive at MIT; therefore, only in rare cases should MIT transfer students have reason to need the benefits of MIT's Pass/No Record system. Under the proposed new grading system, transfer students should, for special reasons only, be allowed to take subjects under the A/B/C/No Record system (normally reserved for second semester freshmen), and never under the Pass/No Record system. Staff in the Dean's Office who are determining whether a transfer student should be under A/B/C/No Record grading or traditional letter grades should base this decision on the entirety of the student's prior college experience, and not on the amount of college-level experience in science.

## Appendix II-A

# Response to Questions in the Charge Pertaining to Pass/No Record Grading

### 1. Are the purposes as outlined in 1972 still relevant and consistent with the goals of the MIT first year experience?

This question makes reference to the 1972 report of the Committee on the Evaluation of Freshman Performance and the goals propounded for Pass/Fail grading that are listed in the charge to the committee (see Appendix I-A). On the whole, the short answer to this question is, “yes.” Not only are the goals as a whole valid on the face of it, they are easy to reconcile with the recent re-articulation of the goals of the first year experience as recently propounded by the CUP. Those goals constitute the first four principles we reviewed in Part I, Section C of this report. The primary deficiency of these goals is that they are not comprehensive enough.

The first and third goals articulated by the CEFP in 1972—to relieve freshman year pressure and to compensate for differences in secondary school preparation—map directly onto the second principle we articulated in Part I, Section C—to provide an effective transition to the MIT environment.

However, the original goals in 1972 did not address directly the other three top educational principles recently outlined by the CUP and adopted by the Subcommittee, namely ensuring that students acquire a *foundational knowledge* of science and the humanities, exercise their *intellectual abilities*, and develop *social skills and acumen*. We suspect that the faculty in 1972 simply assumed that students would be naturally driven academically, and therefore academic goals did not need to be addressed directly in a discussion of the grading system. Therefore, if we were to re-articulate the goals of the freshman grading system we would include the mastery of foundational knowledge and the exercise of intellectual abilities—goals that are consistent with an effective transition to MIT, but not identical to it.

In addition, the 1972 goals that speak to transition and compensating for differences in preparation do not directly address the fourth of the CUP’s educational principles which we also embraced, namely the development of social skills and acumen. Given the significant academic pressures at MIT, the faculty need to state clearly that it values the exploration of areas outside the formal curriculum; the freshman grading system should be structured both to encourage that exploration and to help students balance curricular and extracurricular demands. Stated another way, one of the goals of the current Pass/No

Record grading system *should be* to encourage first year students to explore the world outside the classroom and to integrate that exploration into their total education.

On the whole, then, the Subcommittee found that the 1972 goals were a useful starting point in evaluating of the current Pass/No Record grading system— so much so that in the Appendix II-B (page 43) we review most of those goals serially. We also found one of the minor goals so vague as to be useless for evaluating the system. Finally, we found that we need to articulate two new goals. Therefore, the Subcommittee suggests the following seven goals as providing the basis for evaluating the current Pass/No Record system and proposing any new changes to that system:

1. *Relieve the anxiety and sense of pressure felt by incoming MIT students during the year of their transition from secondary school to work in a university of high quality and high expectation.*
2. *Encourage the acquisition of foundational knowledge of science, the humanities, arts, and social sciences and encourage the exercise of the intellectual abilities of our students. (new goal)*
3. *Encourage the development of social skills and acumen for MIT and beyond. (new goal)*
4. *Develop in each student a more mature motivation for his or her university education and a more active, expressive involvement in his or her studies; and to give the student a sense of freedom to make a wider choice of subjects and a wider choice in the allocation of time among subjects when a topic within any one of them strikes that student as especially exciting.*
5. *Give incoming students a year in which to compensate for differences in their secondary school preparation.*
6. *Enrich the evaluation of student performance and experience in each subject.*
7. *Change the image of MIT as a school that grinds out students mechanically, a school that only “tools” would find congenial.*

**2. What are the statistical trends with respect to subject enrollments, grade distributions, average loads at the start and end of term, etc.?**

Although the formal description of the MIT curriculum would suggest that freshmen all undertake an identical course of study, that stereotype is far from the truth. Mostly because of their performance on advanced placement examinations, the “average” entering freshman

has at least one of the Science Requirement subjects out of the way (usually 18.01), and often two (18.01 plus one of the sciences). In addition, because many students put off 7.01 until the sophomore year, the typical entering freshman has two or three “free slots” out of the eight or nine subjects typically taken by freshmen.

(To aid in this discussion, Table II-A-1 of this Appendix reports a summary of all freshman enrollments and Table II-A-2 reports the subjects with more than 50 freshman enrollments in AY1999–2000.)

What do these students do with their “free slots?” In the first term, the overwhelming majority of freshmen take the “next” subject in the science curriculum. For instance, in Fall 1999, 594 freshmen took Calculus II; 82 took Physics II. In addition, 109 took 5.12 (Organic Chemistry) and 82 took 6.001 (Structure and Interpretation of Computer Programs). Although there is some controversy about the number of freshmen enrolling in 6.001, on the whole freshmen who take it in the Fall tend to receive *higher grades* than upperclass students. Because we later report that freshmen on the whole receive lower letter grades than upperclassmen, these grades indicate that Fall Term freshman enrollments in 6.001 are a bright spot in the first year, in the following sense: A great number of these freshmen are very devoted to the material taught in 6.001, and therefore devote the extra time and attention necessary to master the subject.

In the Spring, the academic choices of freshmen are even more varied. Many of the students who got a jump start on the Science Requirement due to advanced placement credit continue acquiring foundational knowledge for their later academic careers. In Spring 2000 612 took 18.03, 164 took 5.60 (Thermodynamics and Kinetics), 231 took 6.001, and 138 took 6.002. Again, there is some controversy about freshman enrollments in 6.001. Unlike freshmen who enroll in the Fall, freshmen who enroll in the Spring perform significantly worse on average, measured by letter grades.

More troubling are reports that in the Spring many freshmen decide to “game” the grading system, taking subjects for which they are unprepared, either due to a general lack of intellectual maturity or the lack of prerequisites. The subjects that are most frequently mentioned in this regard are 6.002 and 5.60. In Spring 2000, for instance, 64% of the freshmen who enrolled in 6.002 did not have the prerequisites listed for the subject (18.03 or 18.06 plus 8.02). Reports from the instructor in 6.002 indicate that these freshmen had significantly greater difficulty than those who had already completed the prerequisites.

It is possible to analyze differences in grade distributions in all subjects because the Registrar’s Office has kept “hidden grades” of freshmen since the early 1990s, integrating them into the MITSIS system for the past five years. In addition, various departments have kept records of the hidden grades of freshmen going back many years, and the Office of Academic Services has distributed information about hidden grades to the departments for nearly twenty years.

Table II-A-3 reports the average GPAs of MIT students over the AY1995–96 to AY1999–2000 period, broken down by year at MIT. The GPA of freshmen is one-third of a grade point lower than upperclassmen. We also analyzed GPA differences within HASS-D subjects, since HASS-Ds are the only part of the GIRs that are regularly taken by large numbers of upperclassmen. Here we see the same comparative pattern—freshmen perform at a GPA level of approximately one-third of a point lower than upperclassmen.

A more nuanced view of GPA differences is supplied in Figure II-A-1, which shows the actual distributions of grades across the four years in AY1999–2000. The biggest difference in the distributions is the downward shift in grades among freshmen compared to upperclassmen. That is, almost half (49%) of grades assigned to upperclassmen are A's, compared to 22% for freshmen.

Freshmen received fewer A's than upperclassmen and many more C's. In addition, the fraction of hidden grades awarded to freshmen that were A's and B's dropped in the Spring, compared to the Fall, while the fraction of C's rose. This is a pattern that held for no other undergraduate class, where the intra-semester drift in grades moved toward A's, if it moved at all. At the same time, the number of failing grades assigned to freshmen was only somewhat higher than those assigned to upperclassmen. In AY1999–2000, 2.7% of freshmen grades were F's, compared to 1.4% for upperclassmen; 3.4% of freshmen grades were D's, compared to 2.2% for upperclassmen.

Considered together, these grade patterns suggest a pervasive problem with freshman academic performance, characterized by a large number of freshmen “getting by” under Pass/No Record.

Another perspective on the amount of effort that students apply to subjects is provided by responses to the Subject Evaluation Guide (SEG), which asks students to estimate how much time they spend each week, on average, on various aspects of the subject. Table II-A-4 describes the amount of time that undergraduates reported they spent on various categories of 12-unit subjects in calendar year 1999 (Spring 1999 and Fall 1999). Unfortunately, the SEG does not ask students to indicate their class/year at MIT, and therefore we cannot compare freshmen and upperclassmen directly. However, the Science Requirement subjects are disproportionately populated with freshmen, and so we can gain at least some insight into freshman/upperclass differences.

Among the different categories of subjects in Table II-A-4, students report spending the least time per week on Science Requirement subjects. Furthermore, there is a significant drop-off in time spent during the Spring, compared to the Fall.

As with GPAs, the actual distribution of hours spent each week in different types of subjects is also telling. Figure II-A-2 displays these distributions, by subject type, for Spring 1999. What is telling about the distributions is this: of all the subject types, the only one

without a “right skew” to the distribution is Science Requirement subjects. This is consistent with a significant number of students putting in a “sufficient” amount of effort each week to get by in the Science Requirement subjects, with very few working beyond what is required in the subject.

The final statistical trend we were asked to report on concerned subject unit loads. Compilations by the Dean’s office over the years have indicated two general trends. First, freshmen have tended to enroll for the maximum of units allowed, and have enrolled for a slightly greater average number of units than upperclassmen. Second, the variance in enrollments have been much lower for freshmen than upperclassmen.

Table II-A-5 indicates that this general trend was borne out in AY1999–2000. Table II-A-5 is divided into two parts. The upper part describes the average number of units in which MIT freshmen enrolled in AY1999–2000, by semester and year. By a small margin, first-term freshmen register for the most units of any class group at MIT, because of the large number of students who either take a freshman advising seminar or 6.001. In the second term the average units drops off a bit, although the “average” freshman is taking three 12-unit subjects and one 15-unit subject.

The standard deviations reported in the upper half of Table II-A-5 are also consistent with past trends of freshmen varying less than upperclassmen in the number of units taken. Further insight into this lack of variance can be gleaned from the bottom half of Table II-A-5, which reports the distribution of students according to the number of units they have registered for. In both terms, the low variance in freshman unit load is due primarily to the small number of freshmen who register for less than a full load of classes—interpreted in this case as being fewer than 45 units.

That roughly one-sixth of sophomores register for fewer than 45 units a semester suggests that coming under grades leads a small portion of students to scale back their academic ambitions to meet the new level of pressure. While we cannot know for sure, this also suggests that a small fraction of freshmen are taking more classes than they “should,” under the shield of Pass/No Record grading. In other words, the Subcommittee suspects that under its recommendation, a similar number of freshmen would take 45 or fewer units in the Spring Term.

### **3. What are some alternative proposals for first year grading schemes that might be considered?**

The Subcommittee considered approximately twelve (depending on how they are classified) alternative grading proposals. A full listing is contained in Appendix II-C (page 50). A few were generated by the Subcommittee itself, but most were generated by faculty members and students who met with us.

**4. Should P/NR grading be limited to the Fall Term only? Are there categories of subjects that should be graded on a P/NR basis regardless of when a student takes them?**

Pass/No Record grading should be limited to the Fall Term. Fall is when the greatest benefits are had with respect to the transition of freshman from secondary school to MIT. In the Spring Term a significant number of students have either made this transition successfully or have learned how to take inappropriate advantage of the Pass/No Record system. In exceptional cases there may be freshmen who encounter first-term difficulties that are so unusual that it might be appropriate to “wipe the slate clean” from the first term. However, the Committee on Academic Performance (CAP) already has flexible authority to address exceptional cases, and nothing in the Subcommittee’s recommendation would change that.

Identifying certain subjects to be graded on a Pass/No Record basis regardless of when they are taken is unsound, for at least two reasons. First, it violates the principle of not creating first- and second-class subjects. Second, it violates the principle of using the grading system to encourage mastery of fundamental material, since the subjects that are usually proposed to fall within this category, mainly Science Requirement subjects, are required for almost all majors.

**5. Should there be options available to instructors or departments to limit enrollments in subjects for students not taking subjects on grades?**

This alternative is related to one the Subcommittee heard, which was to allow departments or instructors to require that all students, including freshmen, taking designated subjects take them on letter grades. A letter from Course VI outlining an alternative similar to this was received by the COC and CUP and forwarded to the Subcommittee. We will address both alternatives here.

It would be unwise to allow departments to require freshmen taking specially-designated subjects to take them on grades, even though their other subjects might be taken under Pass/No Record. Such a system would easily create a two-tiered set of subjects for freshmen— subjects that needed a lot of attention because they were being graded and those that could be put off. Freshmen should be encouraged to master all the subjects they take in the first year and therefore should not be tempted to master some and not others. A Pass/No Record system should apply to all freshmen or no freshmen.

At the same time, there are virtues in a system that might restrict subjects to students taking all their subjects on letter grades. The special virtue is that it does not create first-

and second-class subjects—a student to whom this system would apply would not be tempted to master some subjects and neglect others *because of* the grading system.

Especially if the current Pass/No Record system is unchanged, then allowing this option to departments would force the issue of accelerated freshmen being offered “sophomore standing” in the Spring Term. Presently about one-quarter of the freshman class has enough units by the Spring Term to be considered sophomores. These students are offered sophomore standing, but only about 10% accept it—presumably because it would require them to forego the benefit of the Pass/No Record system. (The advantages of sophomore standing are that the credit limit is lifted and a student is allowed to choose a major and therefore enter a department.) A fuller discussion of sophomore standing is contained in the discussion of Advanced Placement policy in Part III.

At the end of the day, however, the recommendations of the Subcommittee would make the consideration of these sorts of policies moot.

**6. The load limit is currently 54 units in the Fall Term and 57 units in the Spring Term. The Fall Term load limit has had an effect on enrollments in Freshman Advising Seminars. Should there be an adjustment or special exceptions made to these limits?**

This question pertains most directly to freshmen who wish to take 6.001, which would put them at the credit limit, assuming it was paired with three 12-unit subjects.

There should be no exception to the credit limit for Freshman Advising Seminars (FAS). First, alternative, high-quality advising venues are available for such students. Dropping an FAS does not end the advising relationship between the freshman and his or her advisor, it just ends the requirement that the student complete the academic portion of the seminar for credit. Taking subjects as “listeners” is also a valuable habit, and one that could be encouraged among freshmen facing a conflict over the FAS or 6.001. Second, and more important, the credit limit was established, at least partially, to encourage students to sample the extracurricular opportunities at MIT. The Subcommittee is uncomfortable crowding even further into the extracurricular time of first-term freshmen, who are already taking more units than upperclassmen. Learning to make choices among the many opportunities at MIT is an important part of the transition here.

Finally, there is still one option available to students who wish to take 6.001 and an FAS for credit: two twelve-unit subjects, 6.001, and the FAS, for a total of 45 units. Because virtually all MIT undergraduates graduate with excess units and the vast majority enroll with advanced placement units in Science Requirement subjects, taking this route would not slow the progress of many students toward their degree.

### 7. What are the incidences and consequences of the “gaming strategies” used by students to maximize P/NR grading?

The type of inappropriate gaming that Pass/No Record grading may induce can be divided into three types. The first might be a tendency to “coast” in a subject once a student knows she or he has done sufficiently well to guarantee at least a C for the term.

The incidence of this sort of behavior is difficult to gauge, although it does occur to some extent. Faculty who teach Science Requirement subjects receive questions from freshmen each term, asking how well they need to do for the remainder of the term in order to pass. The number of these students is small, but it is likely the tip of the iceberg. Similarly, the grade distributions reviewed above suggest a widespread easing off of effort among freshmen in their subjects.

The second type of inappropriate gaming might be a tendency to take inappropriate subjects to “get them out of the way” under Pass/No Record. “Inappropriate subjects” in this case are defined as subjects that a student is unprepared for, either because he or she has not passed the prerequisite(s) or because the student lacks a level of intellectual maturity necessary to get the most out of the subject.

A limited number of subjects recur in the discussion of this type of gaming strategy, especially when it comes to students not having the prerequisites. As mentioned above, 6.002 in Spring 2000 was particularly worrisome. At the same time, past review of the problem by the Dean’s Office has indicated that only around 10% of freshmen register for advanced subjects without having the prerequisites. Although taking subjects without the prerequisites is a temptation under Pass/No Record, this narrow problem could be addressed more appropriately by clarifying the right of faculty to exclude such students from their subjects and encouraging the Registrar to identify such students early in the term. Such a pilot program is currently under way in the Physics Department.

Finally, many faculty members and administrators single out 6.001 as the type of subject that freshmen take to “get out of the way” under Pass/No Record. In AY1999–2000, 313 freshmen took 6.001. Although some freshmen may be taking 6.001 for the “wrong” reasons, it is likely that the vast majority are making the correct choice of taking 6.001 when they do, since it is the gateway subject to the largest major at the Institute, and it has no prerequisite.

A final type of gaming strategy may be the shifting of attention away from one subject in order to concentrate an inordinate amount of time on another. We have no firm grasp of how prevalent this problem is. It is also not clear that even if this is a widespread phenomenon that it is necessarily a “problem,” since one of the expressed goals of the original Pass/Fail system was to allow freshmen extra latitude to explore topics that especially interested them.

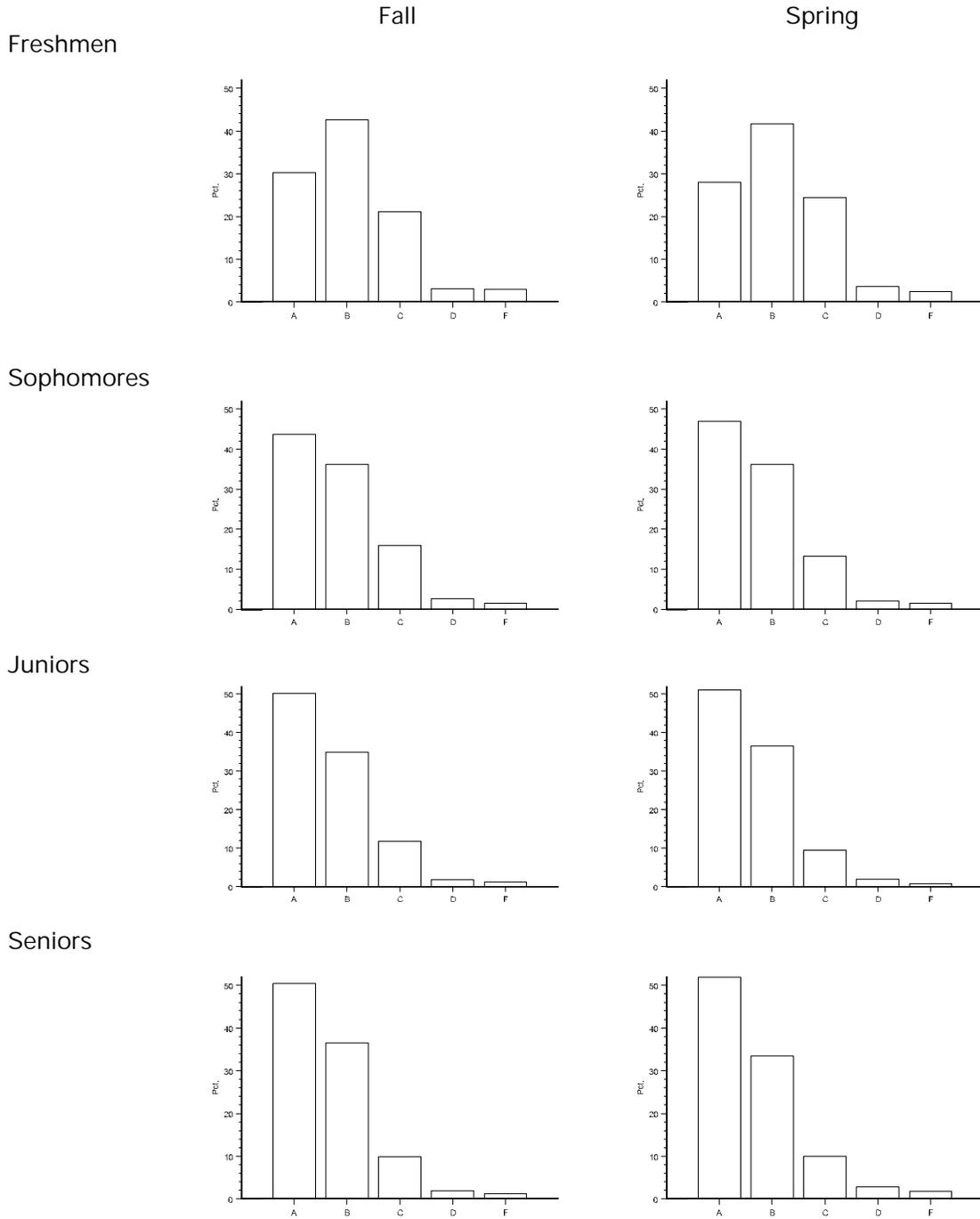
**8. How does the awarding of advanced placement credit influence student choices in the first year?**

Behind this question is an assumption that an extensive granting of advanced placement credit may interact with Pass/No Record grading to produce an especially volatile mix. With additional “free” slots in the schedule, a student might be tempted to push ahead and take exceptionally difficult advanced subjects, to get them out of the way without the discipline of letter grades.

As mentioned many times already, most students come to MIT with at least one advanced placement subject, and so there is an “extra” subject at the disposal of most students in the Spring Term of the freshman year. Nonetheless, the subjects with the largest enrollments outside the GIRs either flow naturally from the GIRs (e.g., 18.03), are first subjects in popular majors (e.g., 6.001, 2.001), or are HASS-D or first subjects in popular HASS concentrations (e.g., 9.00, 14.01). Advanced placement credit causes some acceleration in the major programs for a significant number of students.

Figure II-A-1

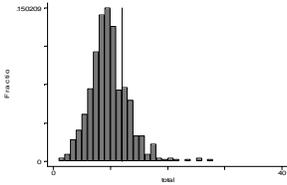
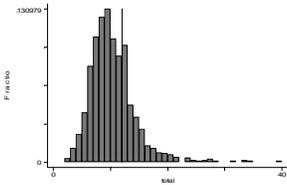
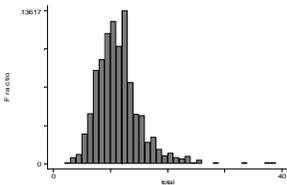
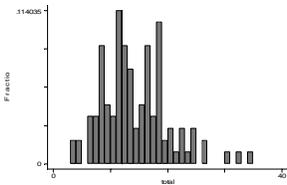
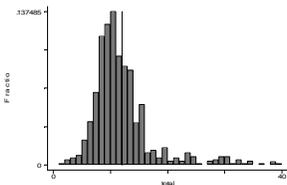
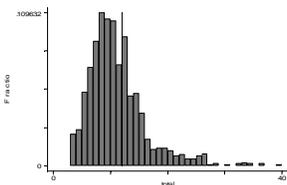
Distribution of Grades Received by MIT Undergraduates, AY1999–2000.



Source: Registrar's Office

Figure II-A-2

Distribution of Self-reported Hours/week Spent on Subjects, Spring 1999.  
 (Note: Vertical bar in each graph indicates the location of 12 units).

		Mean	s.d.	skewness
Science Requirement		9.3	3.3	0.86
HASS-E		10.0	4.4	3.26
HASS-D		10.9	3.9	1.54
LAB		14.3	7.0	2.01
REST		11.6	5.5	2.19
Other		10.8	5.4	2.06

Source: *Subject Evaluation Guide* data, Spring 1999; Population: All undergraduates.

Table II-A-1

## Enrollments of Freshmen, AY1998–99

	Fall	IAP	Spring	Total
Biology	111	0	204	315
Chemistry	674	0	63	737
Calculus I	435	28	18	481
Calculus II	742	170	270	1,182
Physics I	896	131	104	1,131
Physics II	108	1	781	890
REST	251 <sup>a</sup>	12	1,321 <sup>b</sup>	1,584
HASS-E	227	13	443 <sup>c</sup>	683
HASS-D	847 <sup>d</sup>	0	549	1,396
LAB	1	0	17	18
All other	211	172	192	575
Total	4,503	527	3,962	8,992

<sup>a</sup>Includes 116 enrollments in 5.12 (Organic Chemistry).

<sup>b</sup>Includes 608 enrollments in 18.03 (Differential Equations), 248 in 6.001, and 138 in 6.002 (Circuits and Electronics).

<sup>c</sup>Includes 163 enrollments in 14.01 (Microeconomics).

<sup>d</sup>Includes 217 enrollments in 9.00 (Introduction to Psychology).

Table II-A-2

Subjects with More than 50 Freshmen Enrolled, AY1999–2000

a. Fall

Subject	Name	Enrollment		Pct. Freshme n
		Total	Freshme n	
3.091	Intro. to Solid State Chemistry	310	290	93.5
5.11	Principles of Chemical Science	298	274	91.9
5.12	Organic Chemistry I	316	109	34.5%
6.001	Structure & Interpretation of Computer Programs	264	82	31.1%
7.012	Introductory Biology	363	84	23.1%
8.01	Physics I	508	483	95.1%
8.01X	Physics I	171	164	95.9%
8.012	Physics I	90	90	100.0%
8.01L	Physics I	77	72	93.5%
9.00	Introduction to Psychology	306	153	50.0%
14.01	Principles of Microeconomics	267	52	19.5%
18.01A	Calculus I	201	196	97.5%
18.01	Calculus I	180	175	97.2%
18.02	Calculus II	394	354	89.8%
18.02A	Calculus	200	198	99.0%
24.00	Problems of Philosophy	109	59	54.1%
24.04	Justice	155	78	50.3%
21W.730	Expository Writing	125	60	48.0%
SEM.XL1	You Can Be a Success	67	67	100.0%
SP.211	ESG: Experimental Studies Group	57	57	100.0%
SP.311	Concourse Program	53	53	100.0%

(continued)

Table II-A-2 (continued)

Subjects with More than 50 Freshmen Enrolled, AY1999–2000

b. Spring

Subject	Name	Enrollment		Pct. Freshme n
		Total	Freshme n	
1.00	Computers and Engineering Problem Solving	200	79	39.5%
2.001	Mechanics and Materials I	88	76	86.4%
5.11	Principles of Chemical Science	77	55	71.4%
5.60	Thermodynamics and Kinetics	236	164	69.5%
6.001	Structure & Interpretation of Computer Programs	302	231	76.5%
6.002	Circuits and Electronics	261	138	52.9%
7.013	Introductory Biology	261	117	44.8%
7.014	Introductory Biology	185	50	27.0%
8.01	Physics I	107	87	81.3%
8.02	Physics II	663	549	82.8%
8.022	Physics II	74	69	93.2%
8.02X	Physics II	154	126	81.8%
14.01	Principles of Microeconomics	340	186	54.7%
16.00	Introduction to Aerospace Design	54	54	100.0%
18.02	Calculus II	237	218	92.0%
18.03	Differential Equations	685	612	89.3%
21W.730	Expository Writing	34	76	44.7%

Table II-A-3

GPA of MIT Students, by Term, AY1995–96 to AY1999–2000

	All Subjects		HASS-D Subjects <sup>a</sup>	
	Fall	Spring	Fall	Spring
Frosh	3.8	3.8	4.1	4.0
Sophomores	4.1	4.2	4.4	4.4
Juniors	4.2	4.3	4.5	4.4
Seniors	4.3	4.3	4.3	4.2

<sup>a</sup>HASS-D data only cover AY1995–96 to AY1998–99

Source: Registrar's Records

Table II-A-4

Average Reported Time Spent Each Week on 12-Unit Subjects, Calendar Year 1999  
(Standard deviations in parentheses)

	Spring	Fall
Science Requirement	9.3 (3.3)	10.2 (3.6)
HASS-E	10.0 (4.4)	10.3 (4.3)
HASS-D	10.9 (3.9)	11.0 (4.1)
LAB	14.3 (7.0)	13.0 (6.4)
REST	11.6 (5.5)	11.6 (5.4)
Other (mostly electives in sci. & eng.)	10.8 (5.4)	12.4 (6.6)

Source: Subject Evaluation Guide.

Population: All undergraduates.

Table II-A-5

## Unit Load Carried by MIT Undergraduates, AY1999–2000

## a. Averages

	Fall			Spring		
	Mean	Median	s.d.	Mean	Median	s.d.
Freshmen	51.8	54	4.2	50.9	51	5.2
Sophomores	51.4	51	9.6	51.6	51	9.3
Juniors	51.6	51	10.6	50.4	48	10.1
Seniors	47.0	48	11.7	43.1	45	14.9

## b. Distribution of units

	Fall			Spring		
	< 45	45–51	> 51	< 45	45–51	> 51
Freshmen	5.3%	32.7%	63.0%	5.6%	56.7%	37.8%
Sophomores	15.9%	47.1%	37.0%	14.2%	45.5%	40.4%
Juniors	17.4%	40.0%	42.6%	20.3%	43.5%	36.2%
Seniors	34.1%	38.6%	27.3%	49.9%	27.0%	23.1%

## Appendix II-B

# Review of Pass/No Record System in Light of 1972 Goals

In this section we review the current Pass/No Record system in light of the seven goals specified in 1972 as part of the CEFPP report. (See the Subcommittee's charge, Appendix I-A.) On the whole, the Subcommittee found that the 1972 goals were a useful starting point in evaluating of the current Pass/No Record grading system. We also found one of the minor goals so vague as to be useless for evaluating the system. Finally, we found that we need to articulate two new goals. Therefore, the Subcommittee suggests the following seven goals as providing the basis for evaluating the current Pass/No Record system and proposing any new changes to that system. Goals 1 and 4–7 were taken directly from the 1972 report of the CEFPP. Goals 2 and 3 are new.

- 1. Relieve the anxiety and sense of pressure felt by incoming MIT students during the year of their transition from secondary school to work in a university of high quality and high expectation.**

Relief of anxiety and pressure associated with the first year at MIT is a goal that is served well by the Pass/No Record system. The relief of anxiety and pressure is the most frequently-mentioned reason why the students we have spoken to like it, and is a supporting reason mentioned by many faculty and administrators, too. Not only is this relief of anxiety and pressure appreciated in its own right, but all recognize that first year students take advantage of the lessened academic pressure to explore a wide variety of extracurricular activities.

Faculty are virtually unanimous in agreeing that this effect is good and succeeds in the Fall. Many faculty express regret in the culture of gamesmanship that infects the system as it plays out in the Spring. This gamesmanship compromises the level of academic focus in that term, ultimately degrading the overall educational experience of many freshmen.

One issue that has been underappreciated in the concern over transition from high school to MIT is the next transition step, from freshman year to sophomore year. Because of the way Pass/No Record is structured, sophomores face two daunting transitions—to externally reported grades and into departments. What is referred to as the “sophomore wall” undoubtedly comes about from the confluence of these two pressures.

**2. Encourage the acquisition of foundational knowledge of science, the humanities, arts, and social sciences and encourage the exercise of the intellectual abilities of our students.**

The grading system should encourage freshmen to become adequately prepared for the later rigors of MIT's academic life. A comprehensive review of the grading system suggests that, in many ways, Pass/No Record grading helps to fulfill this goal. Broadly speaking, when students speak of the uncertainties they face when first coming to MIT, and of the value that Pass/No Record grading had in helping them overcome those uncertainties, they are testifying to the assistance that the grading system lends in helping students learn by removing the distractions of self-doubt.

There is also broad evidence that the current grading system eventually undermines a mastery of fundamental material. In one sense it must do that, at least a little. Yet a small sacrifice in academic mastery may be a price worth paying if it leads *in the long run* to a better-prepared and more confident student. Still, the less the Pass/No Record system functions as an innocent safe haven for student adjustment and the more it functions as a system that actively encourages inattention to studies, the more it becomes an active tool for avoiding material that must be mastered before going on to the sophomore year. And when that happens, the short term costs of the grading system do not exceed its long term benefits.

**3. Encourage the development of social skills and acumen for MIT and beyond.**

The backgrounds and expectations of entering MIT students are more varied now than they ever have been, not only because there has been a small shift away from engineering, but also because the engineering profession itself is changing rapidly. Still, there is a stereotype of MIT undergraduates, not entirely divorced from reality, that depicts many of them as academically developed at the expense of their social development. Therefore, Pass/No Record grading affords freshmen an opportunity to expand their horizons beyond the books and computers and into the larger social realm.

The most serious concerns that have been raised about the current operation of the Pass/No Record system have to do with the issue of *balance* between social skills, on the one hand, and academic skills, on the other. The current system lacks serious constraints on the allocation of extracurricular time, which undermines the ability of students to strike an appropriate balance. We do not recommend the creation of the equivalent of a "credit limit" for extracurricular activities, but we do note that a traditional system of letter grades would place extracurricular exploration within a more appropriate context.

**4. Develop in each student a more mature motivation for his or her university education and a more active, expressive involvement in his studies; and to give the student a**

**sense of freedom to make a wider choice of subjects and a wider choice in the allocation of time among subjects when a topic within any one of them strikes that student as especially exciting.**

This goal has three components—mature motivation, selective attention to material, and exploration—which will be discussed separately.

*Mature self-motivation.* There is mixed evidence that Pass/No Record grading helps to advance the development of a more mature motivation for university education.

MIT students get admitted because they have proven themselves able to take the initiative; the vast majority continue that course throughout their four years at MIT, including the freshman year. At an institution like MIT, however, grading systems never work as the primary motivator for hard work—grades work on the margin. In a world in which all successful people are rewarded (through money, prestige, awards, etc.) on the margin for working harder than their self-motivation would carry them, it is contrary to everyday experience to imagine that extrinsic rewards would not cause many MIT undergraduates to apply themselves even more effectively to their studies. In other words, universities have long had the experience that a grading system can be useful in concentrating the minds of even the most motivated students.

Some of the strongest evidence that Pass/No Record grading undermines the development of a mature motivation for learning comes from the students themselves. The common advice given by upperclassmen to freshmen that they should get certain subjects “out of the way” under Pass/No Record is clear evidence of gamesmanship. Questions of instructors by students of what is necessary to “pass this course” is also clear evidence that mature self-motivation has not been achieved.

*Selective engagement with material.* This sub-goal is not an unmitigated good, and is probably the source of some tension between faculty and students. Encouraging freshmen to neglect subjects that do not interest them in order to concentrate on subjects that do has a real cost. Most importantly, it undermines the mastery of fundamental knowledge that is supposed to be imparted in the freshman year. Although students may have a rough sense about which material they encounter in the freshman year will be useful later on, they rarely know this with precision. Many faculty who teach the entry-level subjects in majors express frustration with precisely this phenomenon, as they must spend an inordinate amount of time reviewing material that should have been mastered in the freshman year.

A second, less obvious effect of selective engagement with the material is on the morale of instructors who teach students who are discouraged from taking their subjects seriously. The Subcommittee heard testimony from Science Requirement lecturers to the effect that

this was a big problem as the Spring Term progresses. Attendance in lectures and recitation sections is a big problem. Finally, if faculty members in departments responsible for the Science Requirement believe that freshmen are discouraged from engaging with material due to the grading system, they will be less likely to invest energy in innovating in the teaching of those subjects.

*Exploration.* In assessing this sub-goal the first thing to be said is that there is no one good definition of what constitutes academic exploration. For some this means exploring alternative paths of majors. For others it means exploring new and exotic fields of knowledge for the purpose of broadening one's horizons.

Even though the paths through the freshman year are various, owing to the different levels of advanced placement credit that freshmen enter with, the side trips do appear to be limited. The great bulk of enrollments outside the GIRs are accounted for by "sophomore-level" subjects that impart general skills that are applicable to a host of majors, such as 18.03, various computer programming subjects, and a few highly-enrolled HASS subjects. Students frequently mention deferring exploration to senior year, when major requirements are largely out of the way and a sufficient number of units have been accumulated to graduate. Therefore, empirically speaking, it is difficult to conclude that the current Pass/No Record system is a major inducement to exploration. Other features of the undergraduate program have a greater effect than freshman grading— particularly advanced placement, the absence of a credit limit, and the HASS requirement— which push exploration into the later years.<sup>3</sup>

The logic of the Pass/No Record grading system also mitigates against exploration in the freshman year, if by exploration we mean taking subjects off the beaten path. In many majors there exists a subject that is widely-known to be tough and threatening to one's GPA. If a freshman, anticipating his or her future academic path, knows with high certainty that he or she will have to take such a subject eventually, it makes sense in the short term to take the hard subject on Pass/No Record. (Also affecting this calculus is the fact that grades given in HASS subjects are slightly higher than in the rest of the Institute and therefore deferring the exploration of HASS subjects until the sophomore year or beyond also makes a certain type of sense for building a solid GPA.)

This discussion of exploration has focused on academic concerns, but there is also the issue of balance between curricular and extracurricular activities. Pass/No Record grading certainly opens up many extracurricular opportunities to freshmen who report partaking of these opportunities at high rates. (See, for instance, the 1995 and 1999 Freshman Year

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<sup>3</sup>Students also frequently voice the view that an important barrier to freshman year exploration is the lack of subjects that allow them to explore majors in science and engineering departments without having completed all the subjects in the Science Requirement. Exemplary counter-examples include subjects like 16.00. It is the Subcommittee's sense that changes to the curriculum, including the addition of new exploratory subjects, would do more to encourage academic exploration than changing the freshman grading system.

Surveys.) There is a lot that is positive about this. However, unlike the curricular world, in which there is a credit limit to help inform students about what is “too much,” the extracurricular world at MIT does not have the equivalent of a “credit limit” for freshmen. What to undergraduates appears to be exciting exploration of many extracurricular options in the freshman year appears to many faculty members as being an unconstrained (except by sleep) overload of extracurricular activities. Although the review of extracurricular activities of freshmen is beyond this Subcommittee’s charge, we cannot help but note the possibility that Pass/No Record grading has created a culture of hyperactivity on the extracurricular side that causes the *quality* of such activities to suffer.

This issue of the appropriate balance of time between curricular and extracurricular activities has become more critical in recent years, and will continue thus, owing to the evolving selection criteria for admitting undergraduates to MIT. Nowadays there are so many applicants who are academically prepared for admission to MIT that the strictly non-academic qualities of applicants loom larger in discriminating between those who are admitted and rejected. The challenge for faculty and administrators who work with the first year program is to transform the extracurricular eagerness of freshmen from one that leads to a high *quantity* of extracurricular commitments to one that leads to a high *quality* of commitments. Even if the current freshman grading system discourages an optimal balance between extracurricular and curricular endeavors, changing the grading system alone will unlikely bring the two into proper balance.

##### **5. Give incoming students a year in which to compensate for differences in their secondary school preparation.**

The heterogeneity of high school preparation is a factor that both students and faculty must contend with. Longstanding evidence at the Institute suggests that, with very few exceptions, students who are admitted to MIT with deficiencies in their backgrounds quickly catch up and are as successful as those who come from privileged backgrounds. Providing a relatively low-pressured environment in which such catching up can proceed—in a way that does not stigmatize students needing a little extra preparation—is unquestionably valuable.

The Subcommittee’s review of Admissions Office records, along with an interview with the Dean for Admissions, suggests that there should be significantly less concern over the heterogeneity of the preparation of entering students, compared to ten years ago, and certainly compared to thirty years ago. As measured by their performance on the indices used by the Admissions Office to guide their decisions, the entering students who are the least prepared now would have been close to the middle of the pack admitted twenty and thirty years ago. Therefore, although MIT still needs to expend effort making sure that all of its admitted students are prepared for the full rigors of MIT, it is important to keep the relative degree of disparity among currently-entering students in perspective.

In discussing the desire to allow first year students to compensate for differences in their secondary school preparation, it bears reminder that virtually all students, regardless of prior preparation, need to overcome bad habits developed in secondary school and acquire new study skills that were unnecessary before coming to MIT. Although entering students are advised that the academic environment at MIT is qualitatively different from high school, there is no substitute for direct experience to drive the point home. Even the best-prepared students need time to internalize the new academic pace they are confronting and master the study skills necessary to deal effectively with it. The current freshman grading system therefore assists well-prepared students acclimate to the MIT academic environment by giving them room to compensate for their own needs to overcome insufficient prior preparation.

#### **6. Enrich the evaluation of student performance and experience in each subject.**

The original Pass/Fail system replaced letter grades for freshmen with a system of narrative evaluations of all freshmen by instructors. This system brought mixed reviews, after numerous attempts to salvage it, and was abandoned in 1995.

On the positive side, faculty, advisors, and students recognized that the narratives, when completed, provided a much greater depth of evaluation and self-assessment than was possible with letter grades. Also, the system involved narrative evaluations given twice each semester, at mid-term and at the end. The mid-term performance evaluations were especially useful in nudging students back on track or in encouraging students who underappreciated their own efforts. The narrative provided a useful moment of *self*-evaluation for freshmen, who were required to initiate the process with a narrative evaluation of their own performance in each subject. Advisors found the system useful because of the richness of the feedback.

On the negative side, faculty found the system imposed an onerous administrative burden, especially those faculty teaching large lecture subjects. Many students neglected their duties to the system, too. Therefore, not all the forms were filled out, and the system left many gaps.

Replacing this system in 1995 was the current Fifth Week Flag, which identifies students who are in danger of failing and communicates this fact with them and their advisors. This has proven to be an efficient and effective system, but it is limited. The failure to communicate with students who are doing better than failing but who could easily fall into that category is a limitation of the current system.

The performance evaluation of freshmen under the Pass/No Record system is the one area in need of greatest improvement.

**7. Change the image of MIT as a school that grinds out students mechanically, a school that only “tools” would find congenial.**

There are two ways of interpreting this goal. First, it could mean that the Pass/No Record grading system should signal that MIT does not expect its students to be driven to the extreme, and to the exclusion of non-academic pursuits. If this is the meaning of this goal, then the current system of Pass/No Record grading is successful. Indeed, it is successful because it has signaled to the outside world that MIT does encourage exploration outside the classroom, especially in the freshman year, without creating the impression that MIT is “soft.”

The second interpretation of this goal is that Pass/No Record grading should signal that MIT expects its students to excel across a broad range of academic subjects, and gives them the latitude to begin this exploration in the freshman year in a low-risk atmosphere. We have seen no evidence that this feature of the grading system has actually been picked up by people outside MIT. Other features of MIT academic program, such as the strong presence of the humanities, arts, and social sciences, and the rich offering in extracurricular activities probably dwarf any effect in this regard that the grading system would have.

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## Appendix II-C

### Pass/No Record Reform Alternatives

1. Fall term P/NR. Spring term A/B/C/NR.
2. Fall term P/NR. Spring term A/B/C/NR for most students. Poorly-performing students allowed to continue under P/NR in the Spring.
3. Eliminate P/NR altogether, both terms, or only in the Spring
4. A/P/NR. (That is, current system applies, except instructors may designate exceptional performance with an A).
5. Designated classes under P/NR, whenever they are taken. These subjects might be in the Science Requirement or the first class in a major.
6. Designated classes under grades. (That is, subjects may be designated as requiring letter grades regardless of when they are taken.)
7. Eight P/NR subjects. (That is, students get eight subjects on P/NR, whenever they want, distributed across all four years.)
8. P/NR for all subjects, all four years.
9. First class in any major P/NR.
10. The major on grades, all other subjects on P/NR.
11. No classes under P/NR without prerequisite.
12. Aggregate GPA for freshman year. (That is, calculate and report the aggregate GPA for freshmen, but do not externally report individual grades.)

# Part III

## Advanced Placement

### A. Policy Background

The primary method of generating credit at MIT for course work done in high school is through the College Board Advanced Placement tests.<sup>4</sup> Table III-1 summarizes the current status of MIT's advanced placement policy for the class of 2004, which entered this Fall. Entering students who have taken other similar examinations, such as the International Baccalaureate examination, are handled on a case-by-case basis, but every effort is made to treat these students comparably to those who have taken the College Board AP exams.

MIT's advanced placement policy can be described in two parts. The first is the assignment of credit for specific subjects, which almost exclusively pertains to subjects that fulfill the Science Requirement. The second part pertains to the assignment of General Elective Credit, mostly for subjects in the humanities, arts, and social sciences, but also for the Computer Science test.

Departments responsible for the Science Requirement have for the most part decided to grant subject credit in these subjects (8.01, 5.11, etc.) to students who score at a level of 5 on the relevant Advanced Placement exam. Recent developments have complicated this general statement somewhat. Both Mathematics and Physics allow students who are eligible for Calculus I and Physics I advanced placement credit to pass more advanced versions of these subjects, in return for receiving extra units of General Elective Credit instead. For freshmen arriving in 2000, the Chemistry Department has decided to experiment by no longer granting 5.11 credit for a score of 5 on the AP chemistry exam, granting credit instead based on an advanced standing exam given during orientation. Physics and Biology have also recently raised the exam score necessary to receive credit from a 4 to a 5.

The second major component of the overall advanced placement policy pertains to subjects in the humanities, arts, and social sciences. Unlike Science Requirement subjects where specific MIT subject credit is given, freshmen who receive a 4 or a 5 on an AP examination in a humanities, arts, or social science subject receive 9 units of General Elective Credit, which can be applied toward graduation but not the HASS requirement.

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<sup>4</sup>The term "advanced placement" refers to the general practice of granting college credit for work done in high school. The College Board Advanced Placement program is the best-known of the advanced placement curricula, but not the only one. In this report when the term *advanced placement* is capitalized, it refers to the College Board program; when it is not capitalized, it refers to advanced placement policy generically.

Table III-2 summarizes the amount of advanced placement credit granted the Class of 2002, which entered in 1998. Nowadays, roughly 70% of the MIT entering class have at least six units of advanced placement credit when they enter. Approximately half the entering class receive advanced placement credit for 18.01 and move directly to 18.02 upon matriculation.

Turning our attention to tests in areas of the humanities, arts, and the social sciences, roughly one-third of the class of 2004 received General Elective Credit for receiving a 4 or 5 on the College Board American History Advanced Placement exam (297) and the English Literature/Composition exam (318). Other frequently-taken exams in the HASS area were European History, American Government, Spanish Language, English Language/Composition, Microeconomics, and Macroeconomics. Table III-3 provides the details of the credit given in humanities, arts, and social science subjects for the class of 2004.

MIT's advanced placement policy is in the middle of the pack in comparison with other elite institutions, and much more restrictive than most American colleges and universities. Among MIT's peers, Harvard and CalTech have stricter policies, with neither taking the College Board examination directly, each using its own examinations for advanced placement or credit. Stanford, Carnegie-Mellon, Dartmouth, Princeton, and Columbia tend to grant subject credit to students who scored a 4 or 5 on Advanced Placement exams, usually allowing that credit to count toward all graduation requirements. Compared to these latter institutions MIT's policy is relatively restrictive. (However, also keep in mind that the MIT undergraduate program is structured differently than peer programs that accept advanced placement credit directly. At MIT, advanced placement credit is mostly an issue in the "core," while elsewhere it is more often an issue in the major.)

Compared to most other universities, however, MIT's current policies are extremely restrictive. For instance, campuses of the University of Wisconsin system grant full college credit to students who receive a score of 3 or higher on an Advanced Placement examination.<sup>5</sup>

Looking back over time, the precise history of MIT's advanced placement policy was difficult, if not impossible, to reconstruct during the time the Subcommittee had to study it. And, in fact, such a precise reconstruction is unnecessary for the recommendations that follow. From a review of documents and conversations with informed observers at MIT, the Subcommittee was able to piece together enough of a history to provide needed context to the subsequent discussion.

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<sup>5</sup>The College Board web site claims that colleges are increasingly granting "provisional credit" to students who receive a score of 2 on Advanced Placement tests. The issue of whether a score of 3 describes college-level mastery of a subject and whether the College Board has been accurately advertising how colleges judge the different scores has recent become the topic of some controversy. See Vasugi V. Ganeshanathan, "Advanced Placement Program Faces New Criticism Over Its Testing Standards," *The Chronicle of Higher Education*, July 14, 2000, p. A45.

Giving entering students MIT credit based on prior college-level work is a longstanding practice. The longest-standing manifestation of this practice is granting MIT credit through the administration of advanced standing examinations which, of course, is not limited to freshmen.

In the 1950s two major initiatives among prominent colleges, universities, and secondary schools were institutionalized when the College Board took responsibility for the Advanced Placement program. Then, as now, the College Board program rested on the development of rigorous secondary school curricula, designed to correspond with high-quality college subjects. Students who take courses that closely follow the College Board Advanced Placement curriculum may take a College Board Advanced Placement examination in that subject. Depending on a student's performance on that examination and the performance threshold set by a participating college, that student may be eligible for full college credit or placement out of a particular requirement by virtue of performance on the examination.

Although the College Board runs the most well-known advanced placement program, other programs have been developed over the years and have begun to compete with it. The most notable is the International Baccalaureate program, which is small but growing in prominence.

We were unable to discover precisely when MIT began granting academic credit for performance on College Board Advanced Standing tests. However, we do know that MIT was accepting some AP exams by the late 1950s/early 1960s, which suggests that MIT was among the first of American universities to accept College Board Advanced Placement examinations for credit.

Changes to MIT's advanced placement policy have been episodic in recent years. The greatest attention to details of the policy have come from departments responsible for the Science Requirement, which have a general responsibility for ensuring that all MIT students have acquired a set of fundamental skills before embarking on their major programs. All of the departments responsible for the Science Requirement, in one way or the other, have in recent years changed their policy about granting credit through the AP route, based on their improved understanding of the actual test material and of how performance on the examinations corresponds with performance in the corresponding MIT subjects. Likewise, the Committee on the Writing Requirement has monitored the performance of entering students on the College Board Advanced Placement English Language and Composition examination and altered the score necessary to use that examination to complete Phase I of the Writing Requirement. On the other hand, there appears to be no active oversight by faculty members of the portion of the advanced placement policy that pertains to the granting of General Elective Credit.

## B. Findings

The CUP charge to the Subcommittee contained six specific questions concerning Advanced Placement Policy. Direct answers to those questions are contained in Appendix III-A.

The Advanced Placement issue was delegated to this Subcommittee because of a suspicion that Advanced Placement and Pass/No Record Grading interacted perniciously. In particular, some faculty and administrators suspected that many students came to MIT with a large amount of advanced placement credit. After the Fall Semester many of these students are essentially through with their Science Requirement and have become, for all intents and purposes, sophomores. With a much greater degree of flexibility in their schedules in the Spring Term, those with these suspicions worried that it was these students *especially* who were gaming the Pass/No Record system in the Spring.

Although there may be some of this behavior occurring, the Subcommittee could not find widespread evidence that the large amounts of advanced placement credit some students arrive with at MIT caused a special problem in combination with Pass/No Record grading. When problems occur, in which students take overly-advanced subjects, the presence or absence of advanced placement credit does not appear to be an obvious contributing factor. On the other hand, students with large amounts of advanced placement credit are mostly proceeding with their undergraduate programs at an appropriate pace.

The EDP identified the problem of "curriculum creep" that may be caused by the large number of advanced placement units MIT students receive. This is a complex issue; commenting on it is beyond the scope of the Subcommittee's capacities.

At the same time, the Subcommittee noted a number of items of concern with how MIT handles advanced placement credit. Because the Subcommittee's charge is broadly to consider how grading and advanced placement credit affect the academic preparation of MIT freshmen, it deliberated on these matters, recommending some changes and clarifications to MIT's policies.

Guiding the deliberations of the Subcommittee were five principles that applied to advanced placement policy in the context of MIT's undergraduate education.

- 1. Appropriate placement of students.** MIT undergraduates arrive with varied levels of prior academic preparation. MIT needs mechanisms in place which allow for these differences to be accommodated, so that entering students might encounter the MIT curriculum at the appropriate level, given their experience.

On the whole, the current advanced placement policy encourages students to encounter the curriculum appropriately, given their prior academic preparation. An important detail in the implementation of this principle is ensuring that the particular mechanisms of

placement—such as College Board Advanced Placement examinations—channel students in the appropriate directions. The active review of advanced placement policies and the scrutinizing of the syllabi and tests by the departments responsible for the Science Requirement is an example of the type of oversight needed.

- 2. Value of further excellence in academic achievement.** Students who excel in high school subjects, as evidenced by doing well on Advanced Placement exams, should be encouraged to continue at an advanced pace in those subjects at MIT.

MIT's current advanced placement policy does not fully reach this goal. In particular, the Subcommittee is concerned that students who have done especially well in chemistry and biology in high school are encouraged to forego these classes at MIT, if they choose. Instead of giving students who receive a 5 on the AP exam a free pass through the Chemistry and Biology requirements, the Subcommittee would feel more comfortable if these departments created versions of their Core subjects that were designed to appeal to these students and then used creative mechanisms to encourage them to take these subjects at MIT. For the current academic year the Chemistry Department has established two versions of Principals of Chemical Science, 5.111 and 5.112, which is keeping in the spirit of this recommendation.<sup>6</sup>

- 3. Value of residential higher education.** MIT should encourage students to experience four years of demanding higher education and discourage early graduation or light loading in college.

The special value of an MIT education comes from spending four years in close proximity with the quickest and most creative minds of one's generation. Therefore, it would be unfortunate if MIT's advanced placement policy encouraged students to shorten their stay on campus, particularly by graduating early. It is heartening to discover that students who come to MIT with a large number of advanced placement units stay in residence for a full four years. A large fraction of these students decide to pursue a second major while at MIT, thus keeping their academic plates full for four years. The Subcommittee was concerned that another large fraction of undergraduates reduce their academic engagement at MIT as seniors. This is a trend that the Subcommittee was unable to examine in any detail, and so it is unclear how great a concern this should be.

- 4. Faculty governance.** Advanced placement policy should be set and regularly reviewed by the Faculty. The most important features of that policy should be written into the

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<sup>6</sup>The subject 5.112 is "for students with an unusually strong background in chemistry," (MIT *Bulletin*) who already have knowledge of the material covered in 18.01.

Rules and Regulations of the Faculty, and regular oversight should be clearly delegated to one of the Faculty's standing committees.

One of the problems encountered by the Subcommittee in its review of MIT's advanced placement policy is that the issue of faculty oversight is murky. The fact that most departments responsible for the Science Requirement have recently changed their policies concerning advanced placement is evidence that active faculty oversight of this area is not dead. However, when changes have been made, there has sometimes been uncertainty about how to proceed formally. In addition, no change in the Institute's policy of granting General Elective Credit for subjects (mostly in HASS) has been made in many years, suggesting that this is one area where faculty oversight has been particularly lacking.

The recommendations of the Subcommittee include provisions to clarify the oversight of advanced placement policy by the Faculty. In particular, we recommend that administration of the policy be moved to the Office of Academic Services and that the responsibility for Faculty oversight of advanced placement policy be clearly assigned to standing committees of the Faculty.

- 5. Local oversight.** MIT has a tradition of deferring to departments in their academic judgements. The same should be true of advanced placement policy. Within broad guidelines, local units should have the flexibility to adapt their advanced placement policies to the particular considerations of the disciplines and to changing circumstances.

The current advanced placement policy corresponds closely with this principle. The recommendations of the Subcommittee are aimed at clarifying the responsibility of the departments in this regard.

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As the preceding discussion suggests, the Subcommittee found that there was much about the current advanced placement policy that was consistent with the overarching goals of the MIT freshman year. Nonetheless, the Subcommittee remained uneasy with the idea of granting college credit—especially *MIT* credit—for subjects completed in high school. At the most, work in high school should lead undergraduates to encounter either more advanced or more varied material while at MIT. It should not serve as a substitute for four years of subjects at MIT.

The following recommendations betray the Subcommittee's balancing of its uneasiness with granting college credit for high school classes with the pragmatic situation that currently characterizes advanced placement policy at MIT. In particular, there will always be a large number of MIT freshmen who have mastered the material covered in the Science Requirement before they have matriculated. MIT departments will therefore always need a

way to assess which freshmen fit into this category before Fall Term Registration Day. If departments responsible for the Science Requirement conclude that an examination offered by the College Board (or other organization) serves just as well as an Advanced Standing exam the department would otherwise give, there is no harm done allowing the departments to take that tack. However, the departments need to regularly judge whether these independent examinations are, in fact, reasonable substitutes for MIT-administered exams. And, the MIT faculty at large need to regularly review its general advanced placement policy, to ensure that it is continuing to allow students to engage with the undergraduate program in a more advanced or varied manner, rather than simply allowing them to graduate early.

### C. Proposal for Change to MIT's Advanced Placement Policy

The Subcommittee recommends that the following be adopted as MIT's advanced placement policy.

- 1. MIT will continue to award MIT subject and general elective credit and placement through advanced placement exams presented by entering first-year students (Advanced Placement tests administered through the College Board, British "A" level exams, etc.). Departments are under no obligation to reward advanced placement credit or placement, however. A score of 5 on the College Board Advanced Placement subject test (or its equivalent on another examination) will generally be the accepted cutoff for receiving subject credit at MIT. Departments may elect to move the cutoff to 4 if they conclude that performance at this level corresponds with "B"-level work at MIT.**

This primarily continues MIT's policies with regards to advanced placement. A number of details in this recommendation bear mentioning.

First, MIT generally offers subject *credit* through advanced placement examinations even though many of her peers simply offer *placement*. This is a subtle distinction that may, under certain circumstances, carry important implications. By offering subject credit through advanced placement examinations, MIT is certifying that the college experience for that subject has been fulfilled in its entirety. For instance, when an MIT undergraduate receives credit for 18.01 through advanced placement examination, the transcript records that the student completed 18.01 and that he or she is 12 units closer to graduation. If MIT simply offered *placement*, it would be certifying that the student had mastered a certain subject matter necessary for more advanced work—and perhaps for the fulfilling of a graduation requirement—but it would not record completion of 18.01 *per se*, nor would it move the student 12 units closer to graduation. The student would need to substitute 12 more units of another academic experience for 18.01—perhaps another subject in mathematics or an additional unrestricted elective.

Although some faculty members and administrative staff care deeply about this distinction—as do most members of the Subcommittee—it is not the Subcommittee’s impression that this concern is widely felt among the faculty at large. In addition, practical considerations intervene to reduce the importance of the distinction between credit and placement at MIT. In particular, most students graduate with more units than required, and therefore the advanced placement credit does not reduce the residential experience of undergraduates.

Rather than engage the credit/placement debate, the Subcommittee was more concerned about the general practice of using high school curricula to certify competence in college-level subjects—regardless of whether that certification carried credit or placement. These concerns range from the philosophical to the pragmatic. Philosophically, most Subcommittee members are uncomfortable with granting college credit for high school work. Engaging in material in a college environment is qualitatively different from engaging in it in a high school environment. An institution like MIT should be encouraging its students to encounter as much material as possible in the more mature college environment.

Practically speaking, the departments and programs that follow the College Board Advanced Placement Program most closely have raised concerns about a downward creep in the standards associated with various scores on the Advanced Placement examinations. This has led to several departments changing their policies in recent years to raise the exam score necessary to receive MIT credit. In addition, MIT has a distinct approach to many of the Science Requirement subjects, and students who place out of those subjects via the advanced placement route often never encounter MIT’s flavor of that subject. This problem is most striking in the case of Biology, where MIT has led a revolution in a field, and to some extent in Chemistry, where a significant fraction of students encounter solid state chemistry through 3.091, which is not a field emphasized in the advanced placement curricula.

Therefore, in crafting this recommendation, the Subcommittee also felt it necessary to ensure that the standards for the use of Advanced Placement exams were high enough for the MIT context. For that reason, the Subcommittee recommends a score of “5” be the default level of performance necessary to garner MIT credit. And it is also important to state explicitly that departments are under no obligation to grant any placement or credit through an advanced placement system.

## **2. MIT’s policy concerning Advanced Standing examinations is unchanged.**

MIT has a long-standing tradition of granting subject credit to students who take advanced standing examinations, which are essentially final examinations for the subjects as taught at MIT. The Subcommittee is entirely comfortable with this practice and does not want its recommendations and findings concerning the Advanced Placement system to interfere with Advanced Standing examinations.

3. The following is the placement and MIT subject credit policy for subjects fulfilling the Science Requirement:
- a. In those cases where a single department administers a specific requirement (e.g., Mathematics), that department will be responsible for certifying examinations or non-MIT college subjects that provide equivalent subject credit for the requirement.
  - b. In those cases where more than one department is involved with a specific requirement (e.g., Chemistry), the departments will be jointly responsible for certifying that placement examinations and non-MIT college subjects provide equivalent subject credit for the requirement. The Committee on the Undergraduate Program will be responsible for resolving any disputes that arise between (or among) departments.
  - c. The College Board Advanced Placement Test or other equivalent examinations may only be used to exempt students from Science Requirement subjects if the particular exam assesses competence in subject matter that is substantially similar to what is taught in the corresponding MIT subject.
  - d. At their discretion, departments responsible for administering elements of the Science Requirement may elect to grant MIT subject credit and/or subject placement based on examinations.
  - e. At their discretion, departments responsible for administering elements of the Science Requirement may elect to grant MIT subject credit and/or subject placement based on college level studies completed while in high school.
  - f. Departments responsible for administering elements of the Science Requirement will report to the CUP every five years concerning student placement out of portions of the Science Requirement via examination, including MIT Advanced Standing examinations. The reports should address the correspondence between examinations accepted for placement and MIT subjects; the numbers of students exempted from portions of the Science Requirement via examination; and the performance of exempted students in subsequent related MIT subjects.

It is important that the lines of accountability for setting MIT's advanced placement policy be clearly delineated and that the route of changing that policy be clearly stated. Most of this recommendation ratifies current practice. The CUP is the Faculty Committee charged with overseeing the first year and the undergraduate program generally. Therefore, it is the appropriate committee for receiving reports concerning the implementation of advanced placement policy for Science Requirement subjects.

4. **The following is the policy for placement and subject credit for other subjects:**
  - a. **Departments are responsible for certifying examinations or non-MIT college subjects that provide equivalent credit for subjects within their departments.**
  - b. **At their discretion, departments may elect to grant MIT subject credit, General Elective Credit, and/or subject placement based on examinations.**
  - c. **Changes in these policies must be reported to the Committee on Curricula.**

This recommendation parallels recommendation 3, and applies to subjects outside the Science Requirement and the HASS Requirement (see below). The Committee on Curricula is responsible for the certification of undergraduate subjects, and therefore is the appropriate Faculty Committee to assemble reports on changes to advanced placement policy more generally.

5. **The Dean of Humanities, Arts, and Social Science shall be responsible for developing and administering policy concerning the granting of HASS or HASS-D credit through examination, and for overseeing changes in the policy concerning granting General Elective Credit for subjects in the humanities, arts, and social sciences.**

The Rules and Regulations of the Faculty charge the Dean of Humanities, Arts, and Social Science with the responsibility for overseeing the HASS requirement. Therefore, he or she should be responsible for administering advanced placement policy that affects that requirement.

6. **At the discretion of individual departments or instructors, advanced placement examinations may be used as evidence of competency in a prerequisite subject.**
7. **The Registrar should begin recording the individual examinations for which MIT undergraduates receive General Elective Credit, rather than aggregating this subject credit together in one single category. This recording should be done in such a way that facilitates monitoring the prohibition against receiving credit through advanced placement examination for a subject that is also taken at MIT.**

The MIT transcript does not currently record the individual advanced placement examinations for which students receive credit. For instance, if a student receives General Elective Credit for the American Government and the American History Advanced Placement

examinations, his or her transcript simply records 18 units of General Elective Credit—nine units for each exam. At the same time, current advanced placement policy prohibits a student from accepting credit for a subject via the advanced placement program *and then* receiving credit for the corresponding subject at MIT—in a sense, “double-dipping.” The failure of the transcript to record the individual advanced placement examinations makes tracking the implementation of this policy virtually impossible. In fact, there is no way of knowing how often this policy is currently violated. In order to ensure the integrity of MIT’s subject credit system and smooth administration of advanced placement policy, it is necessary that the transcript record clearly which examinations MIT undergraduates have received credit for.

- 8. The administrative office at MIT responsible for tracking the evolution of MIT’s advanced placement policy, supporting efforts by the Faculty to update those policies, publishing departmental advanced placement policies, and reporting on the statistical trends related to advanced placement at MIT should be moved to the Office of Academic Services.**

The “Director of Advanced Placement” is currently housed in the Admissions Office. This administrative detail is a vestige of a much earlier practice at MIT, long-abandoned, of active involvement by several faculty members in the day-to-day operations of the Admissions Office. Under that regime, it was appropriate for day-to-day decisions concerning advanced placement policy, and its overall administration, to be made in the Admissions Office.

This administrative arrangement is no longer appropriate. The most important decisions about advanced placement concern whether matriculating students should receive MIT subject credit for the successful completion of high school curricula. This is an academic decision, not an admissions decision. Therefore, it is more appropriate for the administrative support of MIT’s advanced placement policy to be housed in a unit of the Undergraduate Dean’s Office that is responsible for the undergraduate curriculum, and the freshman year particularly. That office is the Office of Academic Services.

In making this recommendation, the Subcommittee is quick to acknowledge the dedication and skill brought to the task of overseeing MIT’s advanced placement policy by the Admissions Office for many years. This is a recommendation based simply on the appropriate alignment of functions.

Table III-1

Summary of MIT's Policy for College Board Advanced Placement Credit  
for the Class of 2004 (entering in Fall 2000).

Biology	12 units of credit for 7.012 for a score of 5
Chemistry	No credit for College Board Advanced Placement examination. To receive 12 units of credit for 5.111, students must pass an exam administered by the Chemistry Department during Freshman Orientation.
Mathematics	12 units of credit for 18.01 for a score of 4 or 5 on the Calculus BC test. No credit given for the Calculus AB exam. However, a student with a score of 4 or 5 on the Calculus AB exam may enroll in 18.01A, which leads to 18.02 after half a semester. If a student with 18.01 credit elects to take 18.01A (for review purposes) and passes it, the 12 units of 18.01 credit convert to 3 general elective units. If he or she elects and passes 18.014, the 12 units of 18.01 credit convert to 9 general elective units.
Physics	12 units of credit for 8.01 for a score of 5 on both parts of the Physics C test. A student eligible for this credit may elect instead to take and pass 8.012, with the 12 units of 8.01 credit for the Physics C test converting to 6 general elective units. No credit is given for the Physics B test.
HASS	Subject credit generally not given. General elective credit, which does not count toward 9-subject HASS requirement, given in increments of 9 units.

Source: MIT Admissions Office, "MIT Advanced Placement and Degree Credit at Entrance for September 2000." Brochure.

Table III-2

Advanced Placement Credit Received by Freshmen in the Class of 2002.

Subject	Count
Chemistry (5.11)	266
Biology (7.01)	242
Physics (8.01)	111
Computer Science (10.001)	105
Calculus (18.01)	507
General AP Credit, of which	(612)
3–9 units	207
12–18 units	155
21–27 units	119
30–36 units	83
39–45 units	34
48–54 units	9
57–63 units	3
66–72 units	2

Table III-3

Advanced Placement Subject Exams in HASS Subjects for Which Members of the Class of 2004 Received General Elective Credit

Test	No. of Exams Submitted	No. of Exams Earning Credit
American History	380	297
Art: History	22	17
Art: Studio Drawing	2	2
Art: Studio General	6	4
Microeconomics	101	90
Macroeconomics	118	98
English Lang./Comp.	259	212
English Lit./Comp.	393	318
European History	159	129
French Language	79	46
French Literature	7	7
German Language	13	10
German Literature	0	0
Gov. & Pol: American	144	102
Gov. & Pol: Comparative	34	22
Latin: Virgil	23	13
Latin: Literature	9	3
Music: Listen & Lit	0	0
Music: Theory	17	14
Psychology	58	53
Spanish Language	134	98
Spanish Literature	17	13

Source: MIT Admissions Office

## Appendix III-A

# Response to Questions in the Charge Concerning Advanced Placement Policy

### 1. What do we know about students who use advanced placement credit? How do they perform in subsequent subjects?

The evidence that has been gathered concerning the subsequent performance of students who receive advanced placement credit has been mostly positive. For instance, in Spring 1999, the Mathematics Department analyzed class choice and grades for freshmen who received advanced placement credit for 18.01 in Fall 1998. Table III-A-1 reports the average grades of these students when they took Calculus II in that term. The 233 students who had received a 5 on the Calculus BC exam and the 16 who received credit through the International Baccalaureate exam performed much better than the average student in 18.02.

In the Summer of 1998 Professor Kip Hodges commissioned a study within the Dean's Office of students who received advanced placement credit for Science Core subjects. Of particular interest was the performance of students in the "second" and "third" subjects of various science fields after students had received credit for the first subject via Advanced Placement. The findings here were consistent: Students in 5.12 (Organic Chemistry) and 5.60 (Thermodynamics and Kinetics) who had received credit for 5.11 through the AP route had higher grades than those who took 5.11 at MIT; students in 18.02 and 8.02 who had received credit for 18.01 via AP had higher grades than those who took 18.01 at MIT.

Despite findings like these, there are still significant pockets of concern over the subsequent performance of students who receive credit for the Science Core through the AP program. First, the Subcommittee is of the opinion that there is intrinsic value to encountering the basic science curriculum in the MIT context. Not only do the MIT subjects stress different material from the AP curricula, but there is very likely a difference in the richness of the experience when this material is encountered among college students. Second, in two cases in particular, Chemistry and Biology, students who receive credit for the Science Requirement through advanced placement never have to encounter these departments again. Of the 1,015 students who received an SB degree in Spring 2000, 259 had advanced credit for 5.11, of whom 133 completed no other Course V subjects. In addition, 315 had advanced placement credit for 7.01, of whom 184 completed no other Course VII subjects.

Third, there was concern expressed in all departments that closely follow the Advanced Placement examinations that the standards of the exams are slipping—that "a 5 isn't what it used to be." This has resulted in those departments raising the score necessary to receive

credit through the AP program and Chemistry's current experiment with abandoning it altogether. Fourth, concern has been expressed about the fact that many students move through the AP curriculum in high school without serious attention to the laboratory experiences that are part of the curricula. This leads to serious problems for these students when they take basic laboratory subjects at MIT, such as 3.081 (Materials Structure Laboratory) and 5.310 (Laboratory Chemistry).

Fifth, and perhaps most important, the correct performance comparison is *not* (for instance) between students in 18.02 who received AP credit for 18.01 versus those who did not receive AP credit. The correct comparison is how students who received AP credit for 18.01 *would have performed* if they had taken a variant of 18.01 at MIT before going on to 18.02. This counterfactual comparison is impossible to make so long as MIT continues to offer AP credit to students, however. The Chemistry Department's current experiment of not accepting scores from the AP examination will help to provide some evidence about what would happen if students who receive a 5 on the College Board Advanced Placement exam take the corresponding subject at MIT.

**2. What are the graduation patterns of students who are awarded AP credit? Do they graduate earlier? Do they earn multiple degrees?**

Only a small percentage of MIT undergraduates graduate in fewer than four years, compared to the large majority of students who come with advanced placement credit. The primary effect of advanced placement credits is two-fold. First, seniors take a significantly lower load, on average, than undergraduates in the other three years. (See Table II-A-5.) Second, advanced placement credit is a significant contributor to the ability of students to pursue a second major, due to the fact that "double majors" must take an extra 90 units beyond the GIRs. In the graduating class of 1999, for instance, 32 out of 56 double majors were able to meet this 90 unit requirement only because of the units received through advanced placement.

**3. What are the statistical trends? Are different subject enrollment or grade distribution patterns emerging? Are these observed patterns related to AP credit?**

Table III-A-3 reports the percentage of entering freshmen who received credit for Science Core subjects in 1985, 1994, and 1998. From 1985 to 1994 the fraction of the entering class receiving Calculus I credit increased from 40% to 62% and the fraction receiving credit for Physics I nearly doubled, from 12% to 21%. Those numbers have recently returned to their earlier levels, due to policy changes enacted by these departments. The fraction of the entering class receiving credit for Chemistry has held steady over the entire period. (In 1985 the Chemistry requirement—then termed the "Chemistry/Biology Requirement"—could be satisfied by taking 3.091, 5.11, or 7.01.) Since its inception in Fall 1993, about a quarter of

MIT's undergraduates have fulfilled the Biology Requirement through the College Board Advanced Placement exam.

There is speculation among some at MIT that students receiving advanced placement credit have been going into more advanced subjects at a higher rate than in the past. Given the difficulty of uncovering detailed views of past enrollment patterns, it is hard to address this concern with much precision. Table III-A-4 presents one attempt to get at this question. Using a report solicited by Dean Margaret MacVicar in 1985 and recent statistics from the Office of Academic Services, we can examine which subjects were taken by more than 50 freshmen in 1985 and 1999. The statistics in Table III-A-4 suggest there has been a broadening of the subjects taken by freshmen over time, but there is little evidence that students have begun taking more advanced subjects. The one major exception is 5.60, which had negligible freshman enrollment in 1985, but which was taken by 166 freshmen in Spring 1999. A concurrent decline in 5.12 enrollments offset this trend.

#### **4. Should MIT continue the policy of allowing advanced placement credit? If so, should the policy be uniform across departments and Schools?**

In principle, most members of the Subcommittee were uncomfortable with the practice of granting college credit for work done as part of a high school curriculum. At the same time, certain practical considerations made the Subcommittee reluctant to recommend a blanket reversal of MIT's long-standing policy of allowing advanced placement *credit*. Therefore, the Subcommittee instead offers three principles for the future conferring of credit through advanced placement. First, if credit is conferred for a specific named subject, the faculty responsible for that subject must certify that the advanced placement exam covers the same material that is taught in that subject at MIT. Second, the faculty must certify that a particular performance standard on that exam is equivalent to the receipt of a "B" in the corresponding subject at MIT.

Third, instead of offering subject credit for advanced placement examinations, departments are encouraged to use General Elective Credit as an inducement for freshmen to take more advanced versions of the corresponding subjects. An example of this practice is in the Mathematics Department, which awards 3 units of general elective credit to freshmen who receive a 4 or 5 on the Calculus BC test (or a 5 on the AB test) and then pass 18.01A. (See Table III-1 for other examples of this practice.)

Finally, although departments should be given the authority to determine the details of how advanced placement exams are treated by their department, there should be a minimal set of standards that apply throughout the Institute. In particular, no department at MIT should offer any credit for performance below a 4 on an Advanced Placement test, or corresponding score for comparable tests.

5. **Should MIT's policy governing advanced placement credit include the granting of MIT subject credit, or should we consider other options (e.g., the awarding of subject placement with no actual MIT subject credit or units; eligibility for MIT advanced standing examinations, etc.)?**

The answer to this question is similar to the previous one. MIT should continue offering credit through advanced placement examinations under carefully crafted conditions.

6. **Should students who are enrolled in predominantly second year subjects (by virtue of the amount of AP credit they have been awarded) be assigned non-optional sophomore standing?**

One practical implication of moving a freshman to Sophomore Standing is to move that student to letter grades and remove the credit limit. This proposal, by itself, is controversial within the Subcommittee, and among those we talked with about the issue. Very few of the freshmen who are offered Sophomore Standing have extensive experience in a college environment beyond MIT, and therefore there is little justification for treating these students as if they have acquired the necessary experience to begin navigating the major. The Subcommittee's recommendation about Pass/No Record grading makes the issue of Sophomore Standing moot with respect to grades.

Table III-A-1  
Performance of Freshmen in 18.02, 18.02A, and 18.023 Who Received Advanced Placement  
Credit for 18.01 in Fall 1998.

Method of completing 18.01	N	Avg. grade
AP exam: AB with a 5	113	3.81
AP exam: BC with a 4	52	3.75
AP exam: BC with a 5	233	4.21
Advanced standing exam	12	4.47
College credit	10	3.70
International Baccalaureate	16	4.58

Note: Average grade of all students: 4.04.

Source: Mathematics Department

Table III-A-2

Comparison of Freshman Students in Science Subjects beyond the Science Core.

Subject	Academic Year	Average grade	
		With AP	Without AP
5.12	1995–1996	4.4	3.4
	1996–1997	4.1	2.9
	1997–1998	4.4	4.3
5.60	1995–1996	4.2	3.6
	1996–1997	4.3	3.9
	1997–1998	4.4	3.9
18.02	1995–1996	4.2	3.7
	1996–1997	4.1	3.8
	1997–1998	4.1	4.0
	1997–1998	3.8	3.4
8.01 <sup>a</sup>	1996–1997	3.9	3.2
	1995–1996	3.9	3.2

<sup>a</sup>Comparison is between students with and without Advanced Placement credit in 18.01.

Source: MIT Office of Academic Services, "Advanced Placement Degree Credit, 1995–1999," July 1999.

Table III-A-3

Freshmen Receiving Credit for Science Core Subjects Through Advanced Placement,  
Various Years

	Entering Year		
	1985	1994	1998
5.11	12%	21%	25%
7.012	—	26%	23%
7.01	12%	—	—
8.01	12%	21%	11%
8.02	?	3%	0
18.01	40%	62%	48%
18.02	3%	5%	0
N	1058	1093	~1050

Sources: MIT Office of the Dean for Undergraduate Education, "Profile of the Freshman Year," December 9, 1985; MIT Office of Academic Services, "Profile of Freshmen Entering Fall 1994," January 1999; Data provided by the Office of Academic Services, December 31, 1999.

Note: In 1985 7.01 fulfilled the "Chemistry/Biology Requirement."

Table III-A-4

Non-Science-Requirement Subjects with More than 50 Freshman Enrollments,  
1985 and 1999

	Freshmen Enrolled in Subject			
	Fall Term		Spring Term	
	1985	1999	1985	1999
1.00	65			61
2.001				97
2.10	61		98	
21.60	50			
21W730		60		
24.00	55	59		39
24.04		78		
5.12		109	243	17
5.60				166
6.001	69	82	324	256
6.002			107	139
6.041				55
9.00	69	153		
STS 200	72			
14.01		52		170
14.02	91		78	29
18.03			490	588
18.06			53	21

Sources: MIT Office of the Dean for Undergraduate Education, "Profile of the Freshman Year," December 9, 1985; MIT Office of Academic Services, "Science Core Subject Enrollments," December 14, 1999.