

A Proposal for a Revision of the Common Core

September 4, 2008

Revised September 24, 2008

Harvey Mudd College Strategic Vision Curriculum Committee

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In the fifty year history of Harvey Mudd College, the core curriculum has played a fundamental role as the coordinated, basic foundation deemed essential to the education of all students at the College. It is the underpinning of the rest of the curriculum and the major programs, the backbone of a common educational experience that unites students in their first semesters, and the broad foundation that alumni cite as one of the most valuable aspects of their Harvey Mudd education.

This Strategic Vision Curriculum Committee proposes to modify the Core in order to advance the goals of the College's Strategic Vision, as well as to adapt to the changing backgrounds and needs of our students. The changes are modest: we believe our proposal retains the strengths of the current Core, while bringing many added benefits. This document gives a summary of the Committee charge, explains its work and the evolution of its thinking, outlines our proposal, and describes many of its features. A draft Motion is attached at the end. We encourage you to read this document carefully.

This document refers to Appendices that may give helpful background information; these are available at <http://www.math.hmc.edu/~su/svcc/>.

The Strategic Vision and the Committee Charge

In October 2006 the College held a conference: "HMC 2020: Envisioning the Future" that brought faculty, staff, students, alumni, and trustees together to develop a new Strategic Vision for the College. The resulting Strategic Vision revolves around six themes:

- Innovation, Leadership, and Impact, Especially in Engineering, Science and Mathematics
- Focus on Experiential and Interdisciplinary Learning
- Unsurpassed Excellence and Diversity at All Levels
- Nurturing and Developing the Whole Person
- Global Engagement and Informed Contributions to Society
- Improvement of Infrastructure and Resources to Support HMC's Commitment to Excellence and Building Community

To carry out the goals of Strategic Vision, the Strategic Vision Curriculum Committee (SVCC) was formed by the Faculty Executive Committee in January 2007 with the charge of examining:

1. student choice and flexibility in the first-year curriculum, e.g., as concerns the ability to study foreign languages;
2. the core, including new roles for departments within the core; college-wide ownership of core courses; thematic and/or blended courses; integration of the life sciences;
3. the expansion of interdisciplinary course options;
4. time for students to explore unique interests; and
5. the relationship between the curriculum and co-curricular activities, particularly as it relates to the strategic planning goal of 'nurturing and developing the whole person'.

The charge asks that the committee "remain cognizant of the diversity goals of the Strategic Vision, issues of workload and work/life balance for students and faculty, and opportunities to increase global engagement for our entire community".

(For the full description of the charge of the SVCC, see [Appendix CH.](#))

Activities of the SVCC and the evolution of its work. Over the past year and a half, the SVCC has examined numerous aspects of the curriculum. Although we eventually settled on the Core as the primary place to direct our efforts in addressing the SVCC charge, we began by thinking broadly about the goals for the HMC curriculum. Each of us brought to the table our own ideas for what the curriculum should accomplish, and while our visions differed, some broad themes emerged: the curriculum should prepare graduates to exercise technical expertise developed through rigorous foundational work; to appreciate and employ different kinds of knowledge as a basis for critical analysis, synthesis, and self-examination; to serve society by addressing the complex problems of the world; to flourish in a multicultural and global environment; and to lead examined and meaningful lives.

To build an understanding of what other schools are doing, we examined the curricula of sixteen institutions to which we might compare ourselves (see [Appendix IN](#) for a summary of ten of them). We found that the core curricula of these institutions are much smaller in scope than our HMC core, including schools such as Caltech and MIT. We interviewed two HMC alumni, Scott Fraser and Kim Vandiveer, who are now prominent faculty members at Caltech and MIT respectively. Professors Fraser and Vandiveer are uniquely qualified to comment on the HMC curriculum, since each of them has led recent core revision efforts at his home institution. Both felt that the current HMC core was too rigid and extensive (more so than their faculty thought was appropriate at their own institutions), and the HMC core would benefit from streamlining in order to afford students greater electivity.

A previous survey conducted by the curriculum committee indicated that HMC students have a strong desire to take foreign languages (82% of 331 surveyed indicated an interest; see [Appendix LA](#)); and the current HMC first-year curriculum makes this difficult, if not impossible. Without an elective in the fall of the first year, only students who have advanced placement are positioned to take a language, but even then our math and humanities core courses that meet 4 days per week, as well as afternoon labs, tend to conflict with 5-day-per-week language courses at the most popular times. In light of our Strategic Vision and our desire to develop graduates who can flourish in a global environment, the SVCC saw the core curriculum as an important place to direct our efforts.

Surveys completed by 64 rising sophomores taking summer math in 2008 confirm student desire for electivity in the first year. Among those surveyed, 72% would have found it valuable to have an elective in their first semester at college (see [Appendix FR](#)). Of those who saw such electivity as valuable, 35% indicated they might have used that elective to take a foreign language, 26% said they might have taken E4 or another engineering course, and the remaining surveys indicate interests in a wide variety of subjects in the sciences, social sciences, humanities, and arts.

The opportunity for students to have several unconstrained elective courses is critical in our efforts to address the Strategic Vision. Currently, some majors have just one unconstrained elective in their four years at the College. If we would like our students to have time and energy to develop leadership, serve society, learn about the world to become globally engaged, and pursue interests beyond their major, then we need to allow them unconstrained electives with which to do so. They could then, for instance, take courses in leadership, or take the seminar in math/science education that does outreach at Pomona High, or take courses to further their understanding of the world, take a foreign language or additional classes in humanities and social sciences, or pursue a sidelong intellectual interest. They could also, if they so desired, continue to take further courses to deepen their studies in their major.

The committee sees the act of choosing electives as an important exercise in educational responsibility for our students, as well as a way to teach them that educational rigor can consist of challenges they set for themselves, not just challenges established by the curriculum. Elective opportunities may also lead to greater student satisfaction.

Not surprisingly, much of our effort in recent months has been devoted to discussion of the purpose of a Core curriculum, as well as various models for the Core that would increase electivity. We differed, sometimes quite substantially, on the purposes of the Core; an appropriate summary is that we saw that the Core serves many functions. Some of them include: (1) developing a basic background in each field, (2) introducing students to modes of disciplinary thinking, and (3) building community through a shared educational experience.

With respect to basic background in each field, we studied the current Core curriculum and asked hard questions of each other about what it is that we deem essential for every HMC student to know. We reflected on the fact that over the past 50 years, as the scientific landscape has changed, our academic program has evolved to include computer science and biology as majors. Moreover, the topics that students are learning in high school differ considerably from the material they were learning 50 years ago, and our curriculum has evolved in response, in particular in the mathematics core (see [Appendix DE](#)). See also [Appendix HI](#) for G. Van Hecke's narrative history of the HMC curriculum 1957-1993.

Ultimately, we began to converge on a Core model that makes substantial progress towards increased electivity for all students at the College (even if it is not as ambitious as some had hoped). In what follows, we will outline the model and describe its features. We believe it will lead to a better educational experience and outcome for our students, and if adopted, we also propose a 5-year time frame after which the new Core model will be assessed.

An Outline of the Proposed Core Model

A formal Motion will be brought to the faculty at its September 25 meeting, and a draft of that proposal is attached at the end of this document. In this section, we will give an outline of the proposed Core model that we have developed. This somewhat less formal description will give a sense of the thinking of the committee. If the Faculty ultimately votes to approve the proposed changes to the curriculum, the SVCC, as its last act, will ask the Faculty Executive Committee to form an Implementation Committee. The Implementation Committee will begin work immediately on many of the specific details, such as scheduling, staffing, etc., so *please refer to the draft Motion for clarification of what is being addressed, and what details are being left to the Implementation Committee.*

A typical schedule for a student under the new Core model would look like this in the first three semesters:

(units are in parenthesis)

1st semester 17 units (13 core)	2nd semester 16 units (13 core)	3rd semester 17.5 units (11.5 core)
Math A (3) Physics A (1.5) / Writing (1.5) Computer Science 5 (3) Chemistry A (3) Chemistry or Physics Lab (1)	Math B (3) Physics 24 (3) HSA 1 (3) Biology 52 (3) Physics or Chemistry Lab (1)	Math C (3) Physics C (3) Engineering 59 (3) Chemistry B (1.5) Choice Lab (1)
Elective A (3) P.E. (1)	Elective B (3)	H/SS Elective (3) Elective C (3)

Notes on the model:

Scheduling. Most of the specifics of scheduling will be left to the Implementation Committee to work out, but there are a few points to note here.

The Writing Course would be a half-course staffed by faculty members from every department. It would be scheduled in tandem with Physics A, with both courses offered in both halves of the Fall semester. Half the incoming students would take Writing in the first part of the semester, and half in the second; Physics A would function in the same way.

The Chemistry and Physics Labs would be offered in tandem and in both the first and second semesters. Half of the students would take Chemistry Lab in the first semester and Biology Lab in the second, and half would proceed the other way around. These "half-and-half" structures would help balance departmental teaching loads for faculty and lab space. For similar reasons, it is expected that Chemistry B would be offered both 2nd and 3rd semesters.

The Implementation committee, working together with various departments, will decide how best to schedule the third semester courses; it is expected several may also be offered in the fourth semester to assist departments with balancing teaching loads and to give students flexibility in completing the Core in four semesters.

Course content. The Writing course and the Choice Lab will be explained in further details in their own sections below.

Math A, B, and C will include material from Math 11, 12, 13, 14, and 62 together with selected topics from Math 61, 63, and 64 that are deemed most essential. The Math department will decide on the content of these courses and the order of topics, in consultation with other departments that may rely on this material. Some thought has already been given to what topics might remain in the Core; see [Appendix MA](#) for a sample outline of a possible set of topics for these courses. Notice that the first semester of mathematics is 3 units (not 4 units as it is currently.) The proposed reduction in mathematics in the Core is 4 units, with 9 units remaining.

Physics A will likely be the material from Physics 23, with the optics and quantum mechanics portion removed and put into Physics C. (Physics A is 1.5 units, whereas Physics 23 was 2 units.) The second semester of Physics is the current Physics 24. Physics Lab is the mechanics lab, most likely material similar to what is in Physics 28. Physics C represents electricity/magnetism and quantum optics. As Physics 53 has been removed from the current Core, the proposed reduction in physics units is 1.5 units, with 8.5 units remaining.

Chemistry A and B will include material from what is currently known as Chemistry 21 and 22 along with selected topics to be decided by the Chemistry department, in consultation with other departments that may rely on this material. Chemistry B is a half course. There will be one required chemistry lab (instead of the current two). The proposed reduction in Chemistry units in the Core is 2.5 units, with 5.5 units remaining.

HSA 1 (Humanities, Social Sciences and the Arts 1) will likely follow, at least in part, the model of the old Humanities 2 program. We anticipate that a set of courses will offer students a choice of topic-focused introductions to various disciplines or inter-disciplinary areas in the Humanities, Social Sciences and the Arts. We would expect these courses to be writing-intensive, building upon foundational work offered by the fall term writing course. The proposed curriculum reform would reduce the contribution of the Humanities and Social Sciences program in the core from 7 units to 3 units, eliminating Humanities 1 and replacing the current spring term HSS elective with HSA 1. There remains an additional 10 course (30 unit) HSS requirement beyond the core.

No 0-unit required courses. Physical education (P.E.) courses, which currently receive 0 units but are required for graduation (3 courses), will receive 1 unit of credit under the new proposal. No more than 3 units of P.E. can count toward graduation requirements. This change reflects a point of view that students should earn credit for courses that are required for graduation.

Similarly, most majors currently have a four-semester colloquium requirement, for which students receive 0 units. The new proposal awards 0.5 units of pass/fail credit for attending colloquia each semester, for a maximum of 2 units of credit. These 2 units of credit will be added to each departmental major cap and must remain pass/fail.

The overload policy will be modified so that P.E. and colloquium courses will not count towards overloads. This will ensure that students will be able to take as many courses under the new proposal as under the current system, without overloading.

No Integrative Experience requirement. The IE (Integrative Experience) program has been extremely successful in generating new courses that have been popular with students. A September 2006 assessment report on the IE program ([Appendix IE](#)) shows that 45% of the Class of 2006 took more than the one IE course (and recent data indicate 45% of the Class of 2007 and 40% of the class of 2008 did as well), and that these percentages are correlated with the number of IE courses that were offered. In fact, data shows the average number of IE courses taken by HMC students is 2, and taking 4 IE classes is not uncommon. The same

report also notes that students in each major were about equally likely to take more than one IE course.

Due to the popularity of these courses, we expect that faculty will continue to offer IE courses and students will continue to take them as electives, even with the removal of the IE requirement.

Units in the Core: This model assumes 37.5 units in the Core. Together with 30 units of additional HSS courses, and 3 units of P.E., there is a total is 70.5 required units (of Core+HSS+PE) for each student in the new Core proposal, apart from the major requirements.

Units returned to Major programs: Each department that has reduced its offering in the Core will be allowed to return those units to their own major programs, if they deem them necessary to the disciplinary education of their major students. So, for instance, Chemistry would receive 2.5 units, Math would receive 4 units, and Physics would receive 1.5 units for its majors and joint majors. This would have no effect on the total number of units required by the major (because current caps on majors are calculated to include both core and post-core department offerings). This return of units is optional; departments are under no obligation to use these units if they do not wish to do so. As noted by the asterisk* below, should the faculty vote to change the curriculum, the Computer Science and Mathematics departments have already decided not to return 4 units to the Joint CS-Math major.

To account for the mathematical background requested by the Engineering department for its majors, 1.5 extra units will be added to the Engineering major to further the mathematical development of its majors. It is envisioned that courses that meet this objective may be drawn from existing math courses or developed and taught by either the Engineering or Mathematics faculty.

In addition each major will receive up to 2 units to account for their colloquium requirements that already exist in their majors (2 units for every major except the math major with receives 0.5 unit and CS/Math which receives 1.5 units).

Thus, under the new Core proposal, the major programs would have the following number of units. (In the table below, "Major" refers to the Major requirements *beyond* that Major's courses in the core, and "Major+Core" refers to the Major requirements *both in the core and beyond the core*.)

Major	Current Units in Major	Current Units in Major+Core	<i>Proposed Units in Major</i>	<i>Proposed Units in Major+Core</i>	Elective Units (currently)	<i>Elective Units under Proposal</i>
Biology	39	42	41	44	9	16.5
Comp Sci	39	42	41	44	9	16.5
Physics	32	42	35.5	44	16	22
Chemistry	35	43	39.5	45	13	18
Mathematics	31	44	35.5	44.5	17	22
Engineering	45	48	48.5	51.5	3	9
Bio+Chem	44	55	48.5	57	4	9
Bio+Math	41	57	47	59	7	10.5
CS+Math	45	61	46.5*	58.5*	3	11*

Note that under this Proposal, every major at the college (including joint majors) would have at least 9 units of unconstrained electives. For sample semester-by-semester models of coursework in each major that meets the minimum graduation requirements under the current and proposed Cores, see [Appendix MG](#).

New Writing Course. We propose a College-owned Writing Course: the "*HMC Writer's Workshop*" that would be taught or co-taught by faculty from all departments. This 7-week half-course will provide explicit attention to writing fundamentals; it will teach students that good writing, critical thinking, and careful reading are inextricably linked; and it will demonstrate that the good writing is a skill valued by all faculty members at the College. The course would be designed to demonstrate that writing is a process, with peer review and multiple revisions, and it would teach students to understand the difference between opinion or assertion and demonstration or analysis.

The Implementation Committee will be responsible for fleshing out the details for such a course, but see [Appendix WR](#) for one possible model, which presumes a common set of compact but rich readings.

Preparing for and maintaining such a course would demand that the College provide training for faculty participants. Ideally the course would be co-taught by a pair of faculty, one of whom has experience teaching such a course, in order to demonstrate the cross-curricular applicability of strong writing skills. Department surveys by SVCC members indicate there is a significant fraction of faculty from many departments who would be interested in teaching such course, given sufficient training. Moreover, preliminary student feedback on this aspect of the proposal has been extremely encouraging, especially regarding the idea that faculty members from all departments would participate in emphasizing the importance of writing.

This course will be most successful when other Core courses provide opportunities for reinforcement and extension of the skills developed in this course, such as peer review, revision, and the development of critical reading and writing skills.

New Choice Lab. We propose an *Interdisciplinary Choice Lab*, which is a 1-unit laboratory course emphasizing interdisciplinary experiential learning. *It is* expected that several courses satisfying the broad goals outlined below will be offered; students must take one of these courses in either semester of the sophomore year. These courses may build upon and extend skills developed in the introductory chemistry and physics laboratory courses taken in the first year.

Choice lab courses should emphasize the confrontation between abstract models of the world with carefully acquired data and experimental observations, allowing students to deepen their understanding of the essential dialog inherent in experimental work. Preferably, courses would include aspects of experimental design, would offer opportunities for the analysis of preliminary work to lead to the refinement of experiments, would be interdisciplinary, and would develop students' abilities to communicate the results of their work. Examples of courses or experiments that may accomplish these goals include:

- the current "lead lab," in which students use state-of-the-art analytical techniques to investigate lead content in local soils, and interact with school children about statistics and science;
- an engineering/physics lab on semiconductor physics and integrated circuits;
- a biochemistry lab;
- a robotics/computer vision lab;
- a course that explores the principles and functioning of modern laboratory equipment;
- a course in which students learn to develop, interface, and debug a data-acquisition system and use it to conduct an experiment.

A lab course taken to satisfy this requirement cannot have its units also count towards a major requirement or elective in the major. For instance, if Choice Lab X is a course also required by major Y, and a student decides to major in Y, then she must take another Choice Lab to fulfill her requirement. That Choice Lab cannot count towards her electives for Major Y.

Assessment. The Motion calls for a review of this new core curriculum five years after inception. This will be enough time to ensure that two classes of students have proceeded through the entire College curriculum with the revised Core as the foundation of their education at HMC. An assessment plan will be developed to evaluate the extent to which the revised Core has the desired effects on our students' learning and academic experience.

Assuming the proposed Core program is implemented Fall 2009, the assessment process would begin during the 2008-2009 academic year in order to establish "baseline" data relative to the current structure of the Core. It is expected that assessments will involve current sophomores as well as first-year cohorts matriculating Fall 2008-2013. Students will be surveyed after completion of the Core. Also, to understand the overall impact of the students' academic experiences on their college career, students will be asked, at the completion of the second semester of their senior year, to complete the College Senior Survey, a national study administered by the Higher Education Research Institute (HERI) at UCLA.

We expect the assessment plan to focus on four areas:

- demographic trends (e.g., enrollment, retention, graduation),
- academic impact (e.g., academic performance of students before/after core revision),
- student satisfaction/perspective (e.g., with respect to electives, scheduling, strengths/weaknesses of the core, effect on student experience), and
- faculty perspectives (e.g., student learning, degree to which core sequence prepares students for their major, courses that students are taking as electives).

A detailed assessment plan will be developed by the Office of Institutional Research in consultation with faculty.

Importance of Advising. The Proposed Core will make the role of faculty advising much more important, especially for first-semester students selecting electives. But it is worth bearing in mind that the number of unconstrained electives in our curriculum remains small compared to other institutions.

Faculty will want to think carefully about how to advise students in the selection of electives. We anticipate that some will encourage students to broaden their horizons by taking courses outside of their intended major, and some may encourage using electives to take major courses in order to save their electives for later. However, departments may not create a program or an environment in which students are *required or compelled* to use any of the 9 units of electivity in the first 3 semesters to satisfy major requirements.

Benefits of the SVCC proposal

Students will have more electives. Foreign language study is now possible in the first year, since there is space for an unconstrained elective in each semester of the Proposed Core, and there is at most one prescribed lab each semester. By contrast, the current Core has no space for an elective in the first semester (barring advanced placement) and requires students to take two laboratories in the 2nd semester. These issues currently complicate scheduling of courses and electives for first-year students, especially foreign languages. The Proposed Core will make foreign language study possible in the first year, and the Implementation committee will pay attention to the times that languages are offered when constructing the Core schedule.

Every department appears in the Proposed Core, and all but Engineering appear in the first year. The new proposal solves the problem that Biology 52 "floats" in the current curriculum, since students can currently postpone taking it until their 5th semester, if they desire. In the new proposal, all students would be exposed to Biology in the first year.

Engineering 59 appears in the second year because the engineering faculty prefers that students have had sufficient background in physics (especially mechanics) and mathematics (especially differential equations), both of which appear in the 2nd semester, prior to taking Introduction to Engineering Systems.

The Proposed Core can be completed in 3 semesters. However, some of the sophomore core courses will be offered both Fall and Spring semesters, so that students will have flexibility in scheduling and faculty can balance space and staffing. These issues will be addressed by the Implementation Committee.

The Proposed Core is still arguably the most extensive Core among our comparison institutions. For example, MIT's core is a "General Institute Requirement" (GIR) of 17 semester courses: 2 math, 2 physics, 1 chemistry, 1 biology, 2 restricted science/technology electives, 1 lab course, and 8 Humanities, Arts, and Social Sciences (HASS) courses. (A Communication Requirement that includes writing may be satisfied by 2 HASS and 2 major courses.)

Most courses at MIT count as 12 units (e.g., lecture courses typically meeting 3 hours per week), which is roughly equivalent to one HMC course of 3 units. A first-year overload is more than 54 units in Fall, 57 units in the Spring (basically 4.5 or 4.75 courses). Requirements for graduation vary by department: typically GIR's plus 180-198 units. This is equivalent to 32-34 total courses, or about 4.25 courses per term.

By comparison, at HMC our proposed Core has more requirements overall, and more requirements in every discipline than the MIT core, and the curriculum required to graduate at HMC would still average at least 5 courses per term (excluding P.E.'s).

As another example, Caltech's courses are offered in quarters, which are 2/3 of a semester. A typical 3-hour-per-week course is 9 Caltech units for the quarter. Thus 13.5 Caltech units is roughly equivalent to one HMC course of 3 HMC units.

The Caltech core requires (all converted here to HMC units): 10 HMC units of math, 10 units physics, 4.66 units chemistry, 2 units biology, 2 units additional technical course, 2 units additional lab course, 0.66 units writing, 24 units of HSS, and 2 units of physical education (P.E.). Requirements for graduation are 486 Caltech units (including 9 Caltech units of P.E.), which is equivalent to 36 semester-long HMC courses (of 3 HMC units) or 54 Caltech quarter-long courses. Thus at any given time, Caltech students are taking an average of 4.5 courses. An overload is a load of more than 5.66 courses for first-year students, 6 courses for others.

By comparison, at HMC our proposed Core is slightly smaller in mathematics (by 1 HMC unit) and physics (by 1.5 HMC units), but in every other discipline is larger and in total units is larger; and one must average at least 5 courses per term.

For detailed summaries of core requirements at many more institutions, see [Appendix IN](#).

The Proposed Core substantially retains the lockstep nature of the Core. A typical student would still have many of the same courses as her peers in the first year. Of the 26 units of Proposed Core in the first year, 21 of them would contain all (non-advanced-placed) students (Math A, Chemistry A, Biology, CS 5, Math B, Physics 24, Humanities), and the remaining core units are expected to contain at least half of the (non-advanced-placed) students.

While we have retained much of the lockstep nature of the Core, we also recognize that the proposal represents a shift away from a tighter lockstep curriculum, in favor of making other benefits, such as electives, possible.

The Proposed Core reflects the faculty view that writing is important in all disciplines. Every department can participate in teaching the HMC Writer's Workshop, and this will send a strong message to students on the importance of developing good writing skills.

There will be no zero-unit required courses. It is right to give a nominal amount of pass/fail credit to students taking P.E. and colloquia, to recognize the time they spend attending such courses. This practice is widespread at other colleges and universities (see FAQ question below).

The proposal will benefit all students, but may disproportionately benefit students from under-represented groups and disadvantaged backgrounds. Accounting 5 units for the P.E. and colloquium requirements would bring us in line with the accounting at many other schools (see below) but also make it possible for students to have a semester or two in which they can opt to take one fewer course than is currently possible. (Note that the number of non-P.E. and non-colloquium courses required to graduate would still exceed an average of 5 courses per term, more than Caltech or MIT, which are at about 4.5 courses per term.)

There may be many reasons why students might need a semester in which they do not have to take five courses: every student has non-academic issues that beset them from time-to-time (e.g., health, family issues), and some students may wish to pursue a passion/intellectual interest/leadership opportunity that doesn't give academic credit (e.g., building a rocket for a science competition, taking dance lessons, entrepreneurship in starting a business).

Moreover, extremely talented students from underrepresented groups and disadvantaged backgrounds often face other challenges that are not so common for students from privileged backgrounds (e.g., a stronger pressure to spend the weekends at home helping the family, pressure to take a job to make extra money, a greater responsibility for one's own academic administration/filling out forms/paying bills if the parents do not speak English, and playing "catch-up" in the first year due to limited educational opportunities in high school.)

FAQ (Frequently Asked Questions)

Q. What has changed in this proposal since SVCC presented a preliminary draft of this proposal to departments last Spring? In response to the very helpful feedback and many excellent suggestions that we received, the SVCC has modified its proposal (which we will refer to as the "Spring proposal") to try to address the most pressing concerns.

One concern in the Spring proposal was the number of simultaneous courses that freshmen would be asked to take in their first semester. The Spring proposal had Physics A (2 units) and Writing (called 'Rhetoric' at that time, 1.5 units) meeting all semester. The new Core proposal reduces Physics A by 0.5 unit so that it is a true half-course, and schedules Physics A and Writing in different halves of the semester.

The quantum mechanics that was in Physics A will now be placed in Physics C, which in the new proposal is back to 3 units (in the Spring proposal it was 1.5 units). The extra units of Physics C will accommodate quantum optics and allow for the full development of Maxwell's equations, which seemed quite difficult to place in a 1.5 unit course.

The Engineering Department expressed strong concern about the impact on their majors due to the reduction of mathematics in the Core by one semester. While the math requirement in the Core has not changed from the Spring proposal (it's still 3 semesters), we have recommended allowing Engineering to add 1.5 units back to their major for the development of a mathematical course (or a menu of courses) that would allow students to deepen their mathematical background. The 1.5 units is big enough for a half-course, while small enough to preserve 9 units of electivity (or 3 courses) for engineering majors.

The Spring proposal recommended reducing the number of units required for graduation to 122 units. This concerned some faculty who felt that 128 units was critical to avoid comparisons with other institutions that require 128 units. The new proposal maintains the original unit requirement for graduation at 128 units.

The new proposal awards credit for required P.E.'s (1 unit each, for a maximum of 3 units) and required Colloquia (0.5 units each, up to 2 units). These 5 units recognize the time that students are already spending for requirements in their curriculum, which have until now received no unit credit.

Q. Isn't the PE/Colloquium credit effectively the same as the 128-to-122 reduction in the Spring proposal? Not quite. Though they would both make it possible for students to have a semester or two in which they can opt to take one fewer course than is currently possible (see above for an explanation of why this is beneficial), the two ideas are different in philosophy. Reducing the unit requirement from 128 to 122 units concerned some who felt that 128 was an important number (many colleges use this number of units, though some give 4 units per course), so that reducing the unit requirement creates the perception outside the College that we are requiring less of our students than other schools (which is not the case if those schools are awarding 4 units per course or giving credit for P.E.'s and colloquia).

Giving PE/Colloquium credit is based on the view that we should recognize the time/effort students are already putting into courses that have traditionally been 0 units. These are a nominal amount of units but it gives some token credit to students for what they are already doing. Many schools award credit for these (see below).

Q. Do other schools offer credit for P.E. and colloquium courses? Many other colleges and universities offer nominal credit for physical education and colloquia. For example, a

majority of the highly selective schools in California give course credit for P.E. classes, such as Caltech, UCLA, UC-Berkeley, and Stanford, as well as Pomona and Scripps. Caltech, UCLA, UC-Berkeley, Stanford also give nominal credit for colloquium courses.

Q. Is the College trying to admit weaker students so that we can be more diverse? No. In concert with the Strategic Vision, we believe that diversity and excellence/talent are not mutually exclusive.

But diversity and educational opportunities are negatively correlated, and if we want our student body to begin to reflect the diversity of the world (so that, for example, students can learn to function in a multicultural environment) we must look for applicants among highly talented youth who have had limited educational opportunities. So the students are not weaker, but their backgrounds may be. The College would like to attract students who have the same talent and potential as students we have normally admitted, but may have weaker backgrounds due to limited educational opportunities.

We believe the benefits offered by this proposal (as described in the previous section) will help us attract such students and allow them to thrive at HMC.

Q. What does "unconstrained elective" mean? An unconstrained elective is any course that is not required to fill a Core, major, or humanities and social sciences requirement, but simply contributes to the total unit count for graduation. It is completely unconstrained--a student may use it to take any course she wishes. The term is used to distinguish it from "constrained" electives such as HSS courses or major electives (in which students choose courses from a particular set of courses, but not all courses).

Q. How does this proposal compare in terms of the number of electives allowed by comparison institutions? Our proposal still offers fewer unconstrained electives to engineering majors than, for instance, engineering majors at MIT or Caltech.

All majors at MIT have at least 48 MIT units of unconstrained electives, the equivalent of 4 HMC courses. (For information on how units translate, see the above section on the core of comparison institutions.) At Caltech, Electrical or Mechanical Engineering majors have 54 Caltech units of unconstrained electives, or the equivalent of 4 HMC courses.

By comparison our current curriculum allows HMC engineering majors 1 unconstrained elective, but our proposal would give them 3 unconstrained electives.

Q. Why didn't you focus on other areas the curriculum besides the Core? For reasons described above, especially with regards to electivity and the ability to take a language in the first year, we felt that the Core was a good place to start. Other areas of the curriculum could certainly be addressed by future committees charged with curricular revision.

Appendices.

All appendices in this document may be found online at:

<http://www.math.hmc.edu/~su/svcc/>

as well as through embedded links. Other documents or information may also be placed at this website, as needed.

Appendix CH. Full text of Committee charge, January 2007.

Appendix IN. SVCC report on Core curricula at other institutions.

Appendix LA. May 2007 report on survey of interest in foreign languages.

Appendix MA. A possible set of topics for the proposed 3-semester mathematics core.

Appendix WR. Description of a possible model for the Writing course.
Appendix FR. May 2008 survey of students about taking electives in the first year.
Appendix IE. September 2006 Assessment Report on the HMC Integrative Experience.
Appendix MG. Coursework for minimum graduation requirements in each major.
Appendix DE. HMC Curriculum decade-by-decade snapshot 1958-2008.
Appendix HI. HMC Curriculum history 1957-1993 (thanks to G. Van Hecke).

The Motion

Based on its charge from the Faculty Executive Committee, and building on discussions with all academic departments and representatives of the student body, the Strategic Vision Curriculum Committee moves that the Harvey Mudd College faculty:

- approve the framework for changing the curriculum described below;
- establish an implementation committee to work with departments on curricular revision, scheduling, and staffing needs, and to bring recommendations to the faculty on a series of curricular innovations and changes described below;
- set a reporting deadline for the implementation committee of 26 February 2009;
- call for a review of the impact of the revision five years after implementation.

The Framework

1. The core curriculum, required of all students except those allowed to place out by examination, will consist of:
 - a. Biology: one 3-unit course taken by the second semester;
 - b. Chemistry: one 3-unit course taken in the first semester; a 1-unit laboratory taken in the first year; and one 1.5-unit course to be taken by the fourth semester (which course fulfills this requirement may depend on whether a student has taken physical chemistry);
 - c. Computer Science: one 3-unit course taken in the first semester;
 - d. Engineering: one 3-unit course on systems engineering taken in the third or fourth semester (engineering students should take this course in the third semester);
 - e. Humanities and Social Sciences: one 3-unit course taken in the second semester;
 - f. Mathematics: 3 units of mathematics in the first semester; 3 units of mathematics in the second semester; and 3 units of mathematics in the third semester; these will comprise topics from single-variable calculus, probability and statistics, linear algebra, multi-variable calculus, and differential equations;
 - g. Physics: one 1.5-unit half course on relativity in the first semester; one 3-unit course on mechanics in the second semester; one 3-unit course on electricity and magnetism and quantum optics in the third semester; and a 1-unit laboratory to be taken the first year;
 - h. College Writer's Workshop: a 1.5-unit course offered in the first semester and required in that semester; this course will be team taught by faculty members recruited from multiple departments;
 - i. Interdisciplinary Choice Lab: one 1-unit laboratory course taken by the third or fourth semester, chosen from a set of offerings developed by the faculty across all departments and approved by the Curriculum Committee; these will emphasize hands-on experiential learning, as well as connections between disciplines.
2. Students will have the opportunity for at least one unrestricted elective in each of the first three semesters. In addition to an unrestricted elective choice in the third semester, students will be encouraged to take a Humanities and Social Sciences elective in their third semester.
3. The standard course load in the first three semesters will be 17, 16, and 17.5 units respectively.
4. Any academic course offered by the College will have non-zero unit credit. In particular, colloquia courses will be assigned $\frac{1}{2}$ unit and PE (physical education) courses 1 unit of credit, with no more than 2 units of colloquia credit nor more than 3 units of PE courses counting towards graduation requirements.

5. The unit requirements of disciplinary majors and joint majors may be increased so that required colloquia courses can be accommodated (by 2 units for all majors except 0.5 unit for Math and 1.5 units for CS/Math). The Engineering major may be increased by an additional 1.5 units to compensate for the reduction of mathematics in the core and accommodate the mathematical needs of its majors.
6. No disciplinary major may exceed 51.5 units of requirements, including its offerings in the core.
7. No major program of study may require a student to take in the first year a course other than those listed here.
8. Our current policy of not recording failing grades in physical education courses on the official student transcript will continue.
9. The overload policy will be modified so that an overload will be defined as "more than 18 credit hours of non-physical education, non-colloquium coursework in a semester".
10. Core courses numbered under 50 and taken by students in their first semester will be graded on the High Pass, Pass, and No Credit scale, with the exception of core laboratories offered both semesters of the first year, which will be graded on the letter grade scale.

The Implementation Committee

1. The committee will consist of nine members: seven from the faculty, with every academic department represented and with some continuity with the current membership of the Strategic Vision Curriculum Committee; and two from the student body, chosen through consultation between the Faculty Executive Committee and the Associated Students of Harvey Mudd College.
2. The committee will work closely with academic departments to revise and coordinate core courses, to establish sustainable staffing models for the core, and to ensure that course scheduling is managed so as to optimize student flexibility in choosing elective courses.
3. The committee, through its own efforts or through subcommittees, will create detailed plans, which must include attention to staffing issues, for:
 - a. College Writing
 - b. Choice Lab
4. The committee will consider the following question and encourage faculty discussion about it: is a "Core Division" necessary or advisable for coordinating the core curriculum and for promoting regular assessment of the core as a whole?
5. The committee will update the faculty about its progress throughout Fall 2008 by reporting regularly to the Faculty Executive Committee, which will summarize the reports in its minutes. Departmental representatives on the committee will also regularly update departments on its progress.
6. The committee will bring a detailed implementation plan to the faculty by the 26 February 2009 faculty meeting. In composing its plan, the committee will consider such factors as the readiness of the curriculum in the various core offerings as well as whether the requisite funding and staffing is in place to deliver the curricular excellence to which the college aspires. The plan will also report on whether any new requirements, policies, or bodies need to be established in order to implement the new curriculum.