

**Strategic Planning Proposal**  
**SEMS – Science, Engineering and Math Scholars at Smith College**  
Submitted by members of the Science Center Inreach/Outreach Committee  
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## OVERVIEW

As part of efforts to enhance academic achievement among underrepresented minorities (URM) and low-income students (LIS), we propose to create a program titled *Science, Engineering and Math Scholars* (SEMS). Key elements of this program include:

- Recruitment of URM and LIS students of promise
- Pre-enrollment and/or academic year programming
- Development of a community of SEMS at Smith
- Curricular reform, particularly of gateway courses
- Improved and expanded peer- and faculty-mentoring
- Assessment through data collection and analysis

## BACKGROUND AND JUSTIFICATION

Nationally, URM lag behind their majority counterparts in obtaining both undergraduate and graduate degrees in STEM (science, technology, engineering and mathematics) disciplines. The discrepancy at the graduate level between proportions of minority recipients and proportions in the general population is most dramatic: in the period 1994-2003, of PhD's awarded in Science and Engineering fields, only 4.2% were awarded to Black students and 4.7% to Hispanic students.<sup>1</sup> The problem of a "leaky pipeline" for minorities in the sciences is well-documented and is a significant phenomenon even as late as the transition from undergraduate to graduate study, the point where colleges like Smith can have a real impact. For example the figures above represent approximately a twofold reduction from the percentages of science and engineering bachelor's degrees awarded to these particular underrepresented groups.<sup>2</sup> Ensuring not only the recruitment and retention but also the *success* of URM at the undergraduate level is therefore critical to any efforts at expanding participation by minorities in the highest levels of STEM fields, since success at the undergraduate level is a prerequisite for graduate study.

At Smith the diversity of our overall student body is clearly one of our greatest strengths. We believe that we are uniquely positioned to be a model for success of URM and LIS in the sciences and engineering. While the Science Center, funded in large part by HHMI, has a recent history of programming aimed at retention of URM in the sciences, we feel that it is critical both to expand this program to reach more students, and to refine and augment its components based on adaptation of proven models from other institutions. To make a more dramatic impact on the success in STEM fields not only of URM but also on LIS, we propose modeling a program at Smith College that takes advantage of some of the best concepts of programs such as the *Scholars in Biology* program at UC Berkeley and the *Meyerhoff* program at U. Maryland Baltimore County.<sup>3</sup> Below we outline some elements that may be incorporated into such a program at Smith; the exact details of such a program will be developed by a group of faculty, staff and students.

## THE PROGRAM

- **Recruitment:** We will work with existing efforts in the admissions office to continue to identify URM and LIS students of promise. Admission to the SEMS program will be through a separate application process. Other institutions have found that reliance on test scores and GPA's alone is insufficient to identify students with the most promise.

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<sup>1</sup> National Science Foundation, Division of Science Resources Statistics, *Science and Engineering Doctorate Awards: 2003*, NSF 05-300, Project Officer, Joan S. Burrelli (Arlington, VA 2004).

<sup>2</sup> NSF, Division of Science Resources Statistics, special tabulations of US DOE, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completion Survey, 1994-2001: <http://www.nsf.gov/statistics/wmpd/underdeg.htm>.

<sup>3</sup> These two programs, including quantitative assessment of their effects, are described in some detail in the following publications: Matsui, Liu and Kane, "Evaluating a Science Diversity Program at UC Berkeley: More Questions Than Answers," *Cell Biology Education* **2003**, 2, 117-121; Summers and Hrabowski, "Preparing Minority Scientists and Engineers," *Science* **2006**, 311, 1870.

- **SEMS-specific curriculum:** We will develop a new course for SEMS, combining a skill-based focus (writing, speaking, quantitative reasoning, critical thinking, etc) with exposure to diverse resources at Smith College (libraries, Jacobson, tutors, etc.). This may be limited to the academic year or may involve summer and/or J-term. Upperclass SEMS will be required to attend a more limited number of workshops targeted for their year (soph, junior, senior). Such workshops will focus on topics like succeeding in independent research and effective long paper writing.
- **Creating a sense of community:** In addition to the community-building aspect intrinsic in activities such as mentoring and SEMS-specific curriculum, the program will seek to foster a sense of group identity and purpose through: 1) a high quality space developed for SEMS in an accessible place in the Science Center; 2) a team of faculty leaders who meet regularly with SEMS to listen and respond to concerns; and 3) appropriate staff to support SEMS, including program administration and support of skill-based courses.
- **Gateway courses:** We will facilitate cross-departmental efforts to ensure that all majors offer entry points to meet the needs of all students. Curricular reform efforts may involve some or all of the following: design of new and/or modified courses, adoption of new pedagogical strategies, and cooperation with extracurricular supports such as peer tutoring. We propose a team-based approach, with working groups comprised of faculty, students and instructional staff (e.g. Jacobson Center) to read the relevant literature and devise a set of solutions with a high chance of success at Smith.
- **Mentoring:** We propose to build on current mentoring programs to develop a strong program of combined faculty and peer mentoring to serve all entering SEMS. Faculty mentoring will include a research component such as that currently implemented with STRIDE students at Smith. Peer mentoring will be formalized from the current model, with the goal of upperclass SEMS serving as mentors for incoming SEMS.
- **Assessment:** To gauge the effectiveness of the program we institute we must collect yearly data on the success of all our students in the sciences. Most of the quantitative data already exist at Smith and will need only to be reported to the appropriate faculty and staff in the sciences. We propose to work with the Director of Institutional Research to identify additional assessments specific to our program (for instance, better tracking of the multitude of student research categories applicable to our students) and to evaluate appropriate control groups based on the experiences of other institutions. We will also work to develop more effective strategies for following educational and career paths of our graduates post-Smith.

## RESOURCES

We have identified the following aspects of our proposed program requiring financial support:

- **Appropriate financial aid packages to ensure excellence:** Data from numerous other institutions demonstrate clearly that financial worries can impede the achievement of excellence by URM and LIS students. Hence, we must ensure that students in the SEMS program are admitted with appropriate levels of financial aid to enable focus on academic achievement.
- **Stipends for SEMS:** A STRIDE-like stipend during the academic year, as well as summer stipends for any summer programming (summer research and/or pre-first-year programming).
- **Administrative support:** Staff to assist with recruitment/application process as well as administrative support of the program, including assessment. Administrative support for our current mentoring programs is provided by the Director of Inreach/Outreach position, which is a part-time position funded by a combination of HHMI and College funds. We envision a greater level of administrative support for the proposed program.
- **Instructional staff:** SEMS-specific courses may be taught at least in part by instructional staff outside the faculty, following the example of quantitative skills courses taught by Jacobson Center staff.
- **Faculty support:** If summer curricular programming is established, faculty should be paid summer salary for participation. We feel that there should be some reward system for faculty who participate actively in this program as mentors, whether that is through direct stipends, support for research, or other avenues.

- **Curricular development:** We propose that a working group of faculty, staff and students undertake the project (semester- or yearlong) for reform of gateway science courses and that participants in this group be paid a modest stipend to recognize the value of this work and to ensure consistent participation. If there are individuals who take on the responsibility of major course reworking, they may require a course release or summer salary for this work.

We believe that a program such as the one proposed above in general terms is an excellent candidate for external funding, particularly in the planning and pilot phases. Our current institutional HHMI grant is up for renewal in 2008; since HHMI has funded efforts in this direction both at Smith and at other institutions, we should include funding for our more ambitious program in this next proposal. We may also be able to obtain funding from government agencies (e.g. NSF, NIH) to support curricular development and/or student stipends for research during the early phases of the program, and we intend to pursue such funding vigorously with the College's support. Finally, we are optimistic that private sources of funding can also be found. Programs at other institutions that are successful in the long term consistently rely on an endowed fund for student and program support, and we therefore envision this program as a fundraising initiative for the College.