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Strengthening the Pathway to STEM Research Leadership at Hope College

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Novice Opportunities

Pre-college Opportunities

Course-based research experiences that start before classes begin are being tested this year. One cohort of students is on campus a week early to be immersed in the research experience and build a community of peer researchers.

Academic Year Courses

First year courses will provide students opportunities to carry out research. Students will conduct research in teams, tackling questions that connect with the course content and many also have societal relevance. Three courses are being offered in the fall of 2013 (in biology, engineering and mathematics) and another will be offered in May 2014. The program goal is to support the development of three more courses in each of the next two years of the program.

One requirement of the program is that all course proposals must address the sustainability of the course. All of the courses developed this year have either replaced existing courses or been modifications of existing courses.

Abstract

Over the past 20 years, awards from the Howard Hughes Medical Institute have supported Hope's efforts to conduct STEM research and to prepare students to pursue careers as STEM researchers. The current program is building upon prior successes to create a deliberate pathway for students as they enter Hope as novices, build STEM Researcher skills through coursework and summer research and eventually become student leaders in STEM Research groups.

Opportunities for Growth as a Researcher

Summer Research

Continued engagement in faculty-student research will allow students to grow.

Academic Year Activities

Intermediate-level courses will continue to hone skills with research and research-like components. In addition, students may continue to work on projects begun during the summers.

Becoming a Leader and Mentor

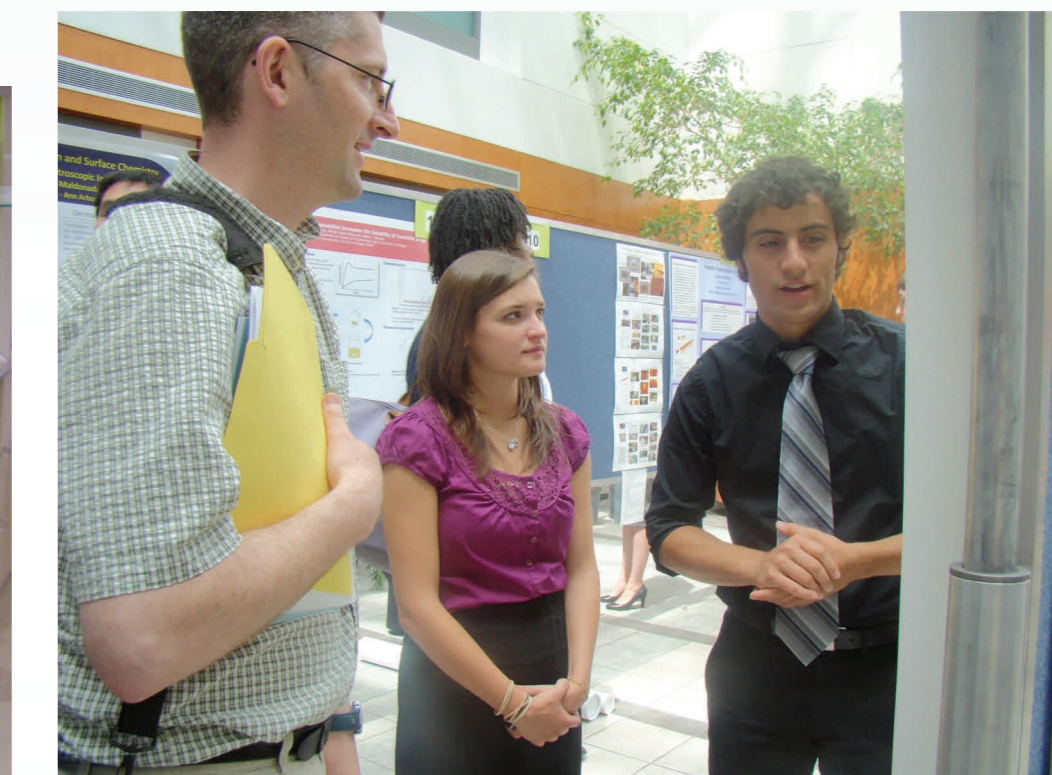
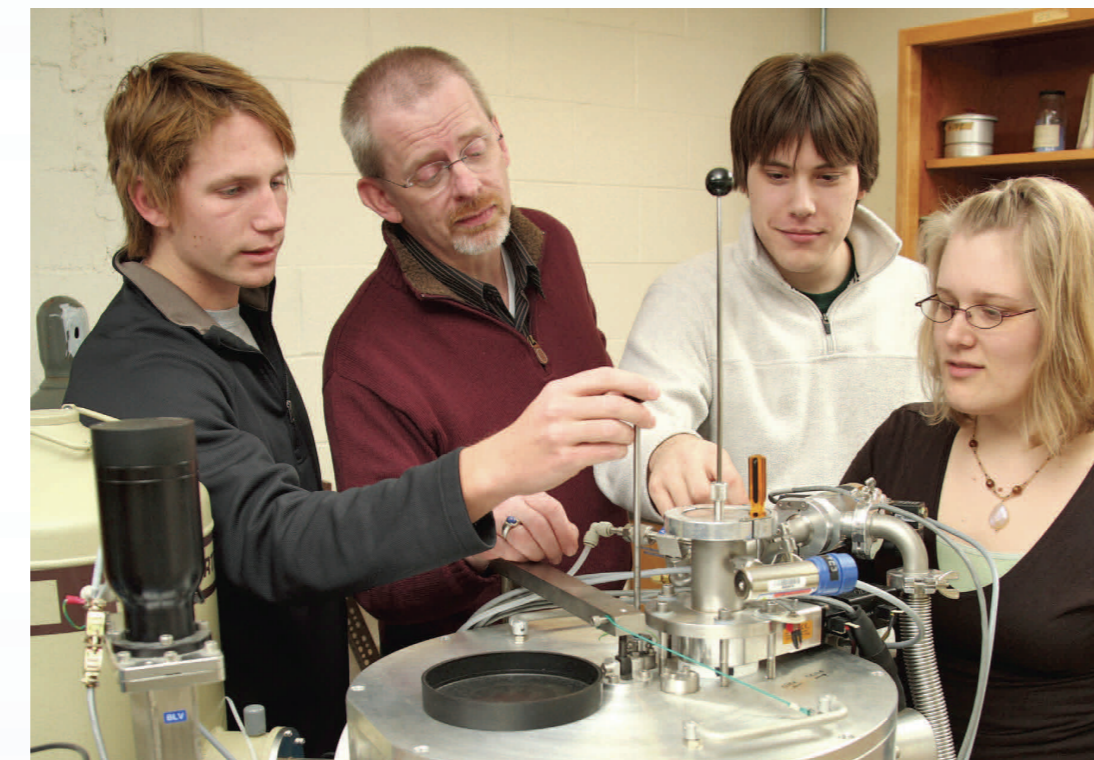
Research Mentor Training

Undergraduate research leaders will participate in a research mentor training program[1]. This seminar series runs in parallel with their summer research program. These HHMI research scholars will serve as mentors to novice researchers in their research group

In 2013, 10 students participated in the mentor training program from eight different departments. The seminar was led by Karen Nordell Pearson. The program was a great success. Students found the discussions valuable and enjoyed the diverse perspectives offered by the other program participants.

Academic Year Courses

Senior-level courses will continue to hone skills with research components. Where possible, these courses will often provide opportunities for students to work in interdisciplinary teams.



Measuring Program Impact

Survey of Undergraduate Research Experiences

SURE will be used to assess the impact of a summer research experience on a student's growth as a research scientist[2]. As students progress along the research pathway at Hope, their responses will be compared allowing us to better understand the impact of various components of the program on their growth as research scientists and research mentors.

Classroom Undergraduate Research Experiences

The impact of research experiences in the classroom will be evaluated using the CURE instrument[3]. In addition to providing information about the impact of the course-based research experience on student growth as researchers, comparison of CURE and SURE results for individual students will provide information on the impact of these different experiences, helping us to understand the impact of different components of the program on student growth as a researcher.

Longitudinal Assessment

Many summer research participants will also participate in course-based research experiences. By tracking across the programs, which will use CURE and SURE (or similar instruments) we hope to identify how the different aspects of their undergraduate experience impacts their growth as researchers.

Retention

Another measurable outcome of the program will be to compare the persistence rates of undergraduate STEM majors involved in the various aspects of the program to those of undergraduate STEM majors not participating in these programs.

References

- [1]Pfund, C. et. al., "Research Mentor Training Seminar", (available at <http://researchmentortraining.org>)
- [2]Lopatto, D. (2004). Survey of Undergraduate Research Experiences (SURE): First Findings. Cell Biology Education, 3, 270-277.
- [3]Denofrio, L.A., Russell, B., Lopatto, D., & Lu, Y. (2007). Linking student interests to science curricula. Science, 318, 1872-1873.

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