

**Improving Student Learning and Student Retention at the Undergraduate Level
Application Cover Sheet**

Maximum funding for any single grant: \$50,000

Proposal must be limited to two pages plus a budget page, in addition to the cover sheet

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Collaborators (other departments, if any)

Chemistry (co-investigators on the HHMI Undergraduate Science Education award)

Title of Proposal Improving Retention Rates of Sophomore Biology Majors

Theme of Proposal Support for students; fostering connections

College Rating (approved; not approved) APPROVED

PROJECT SUMMARY

Purpose

The Department of Biology is committed to building an academic environment for its undergraduates that fosters a sense of inquiry, a passion for discovery, and an appreciation for the role of the scientist in today's world. With over 1200 majors, we recognize the challenges inherent in providing the individualized attention to our students that will give them the best opportunity for success in academia and beyond. Like GSU as a whole, we are concerned about the 6-year graduation rate for our majors (currently 30-40%). The strategies outlined in this proposal are designed to improve our student retention rates, with particular emphasis being placed on helping students successfully matriculate from the sophomore to the junior year.

Goals

We propose to utilize the following two approaches to improve the retention rates of our sophomores. The first is aimed at improving student learning and performance, while the second is designed to make students aware of the importance of advances in biology to the individual and society, as well as the value of pursuing a career in the biological sciences.

- 1) **Supplemental Instruction (SI)** tutors will provide enrichment activities for students enrolled in our introductory courses (Biol 2107K and 2108K) and our gateway course to the major (Biol 3800: Molecular Cell Biology). This SI program will be modeled after the SI pilot project that was successfully implemented for biology non-majors last year.
- 2) A 2000-level **Sophomore Connections (SC)** course will be developed that provides students with an appreciation for the exciting opportunities brought about through the application of biotechnology to biological and chemical problems. This course has the added benefit of serving as a recruitment tool for our new "Biotechnology and Society" program, an undergraduate program jointly sponsored by the Departments of Biology and Chemistry, that was recently awarded a 4-year, \$1.5M grant from the Howard Hughes Medical Institute (HHMI).

Activities

Supplemental Instruction. Last year, the Biology Department was chosen as one of three departments to participate in a SI pilot project, where selected graduate students sat in on the professors' lectures, prepared enhancement activities related to the lecture material, and made themselves available to students at defined times during the week. Student participation in SI sessions was voluntary, and students could attend as few or as many sessions as they wished. Preliminary assessment of biology's SI program revealed that students who attended at least two SI sessions received significantly higher grades and were less likely to withdraw from the class than their counterparts who did not attend any sessions.

We propose to apply the SI model that has been successful for our non-majors to our majors' courses. Our target courses will be the three courses required of all majors: 1) Biol 2107K/2108K, the two introductory courses taken by students as second-semester freshmen and first-semester sophomores, respectively, and 2) Biol 3800 (Molecular Cell Biology), our gateway course that is a prerequisite for all upper division courses and is taken by second-semester sophomores. These courses all have relatively high DFW rates (a three-year average of 20% each for Biol 2107K and 2108K and 32% for Biol 3800). Typically, the department offers 3-4 sections/academic semester of all three courses; collectively, these courses serve more than 1000

students per year. In our pilot project, we will provide SI tutors for two sections of each course per semester (plus one summer section). Dr. Therese Poole (senior lecturer in biology) will supervise the SI project.

Sophomore Connections. The \$1.5M HHMI grant awarded to GSU (starting date: 9/1/06) will fund a comprehensive program of study and research in biotechnology, a discipline that can be applied to nearly all areas of biology and chemistry. Funds awarded by the grant are targeted only for upper division undergraduates, however. In its summary evaluation, the HHMI review panel recommended that we find ways to make biotechnology accessible to lower division students as well. We enthusiastically endorse this recommendation, since we see it not only as a mechanism for recruitment into our new biotechnology program but also as a means to improve retention rates at the sophomore level. To meet both of these objectives, we propose to develop a 2000-level Sophomore Connections course in biotechnology (a 2-hour 2000-level course entitled “Frontiers in Biotechnology,” was approved by the College Curriculum Committee in 2005, but has not yet been taught). This course (which can be applied to Area F) will be designed to show students how the scientific advances made possible by biotechnology have had a profound impact on society, raising such controversial issues as the sale of food prepared using genetically modified organisms, the use of embryos for stem cell research and cloning, and the right to confidentiality of genetic information. The course will follow the SC model: students will be encouraged to form a community of scholars, provided with advisement on coursework and research opportunities within the Department, and shown how proficiency in biotechnology can translate into successful post-graduate studies and employment in many areas of biology. We will design small classes led by a graduate student trained in mentoring (through the HHMI-based “Entering Mentoring” workshop) as well as in course content. Three GTAs will initially be assigned as instructors for the class. Thus, at a maximum of 25 students/section, we expect to be able to accommodate up to 75 students, or about ¼ of the sophomore biology pool (~300 students). If the SC adaptation of the biotechnology course is successful, we will redesign current 2000-level courses (such as “Microbiology and Public Health”) to conform to the SC model. Dr. Barbara Baumstark (Professor and Project Director for the HHMI grant) will coordinate the development and implementation of the SC courses.

Assessment

a. SI courses: We will compare the WDF rates of those courses that utilize SI tutors with those that do not. Within a given course, we will also compare grades and W rates of those students who take advantage of the SI tutoring option and those who do not attend SI sessions.

b. SI and SC courses. We will conduct longitudinal assessment of students in both the SI and the SC courses to determine their preparation for upper division work, their graduation rates, and their success in post-graduate education and/or employment. Students will also be surveyed to determine whether their perception of biology, and of themselves as biologists, is affected by their participation in the SI-assisted or the SC courses.

Time Line (2006-2007)

Fall, 06. SI tutors will be provided for two sections each of Biol 2107K, 2108K and 3800 for Fall and Spring terms. The SC Biotechnology course will be developed for the Spring’07 term. GTAs will assist in course development and take part in the “Entering Mentoring” workshop.

Spring, 07. Three SC Biotechnology sections will be offered, accommodating up to 75 students.

BUDGET

Budget Explanation:

SI courses. We request a total of five SI tutors per course. These will be assigned to two sections of each course during the Fall and Spring semesters, and one section during the summer. A supply budget is also requested to fund a training workshop for graduate students (both SI and SC) and interested faculty. Four of our faculty members (Drs. Poole, Carruth, Attanasio, and Said) have been selected to attend HHMI-sponsored summer mentoring workshop, which will serve as a model for our workshop. These faculty members will provide invaluable assistance in training our tutors.

Sophomore connections. Faculty release time is requested to allow development of the sophomore connection course in biotechnology. Three GTAs are requested for the first year. They will be paid a total of \$3000 over a two-semester period: \$500 during the Fall semester, when they assist in course development and receive mentoring training, and \$2500 during the Spring semester, when they will serve as course instructors.

Evaluation. A GLA/GTA is requested to collect and process data for assessment purposes.

Funding projections for subsequent years: Allotment of funds in subsequent years (if such funds are forthcoming) will depend on the results of the assessment process. If the SC course in biotechnology has a significant impact on retention, additional funds will be made available to faculty members for the redesign of other 2000-level courses around the SC model (the Department currently offers six other 2000-level courses that fulfill the corresponding Area F requirements). With the SI-assisted courses, funds will be redirected as necessary to those courses where the improvement of retention rates is most pronounced. The ultimate goal is to provide SI tutors for students in all sections of courses where they are found to be effective.

Supplemental Instruction

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| GLA/GTAs for Biol 2107K (five @ \$2000 each) | \$10,000 |
| GLA/GTAs for Biol 2108K (five @ \$2000 each) | \$10,000 |
| GLA/GTAs for Biol 3800 (five @ \$2000 each) | \$10,000 |
| Supplies | <u>\$ 1,000</u> |
| | \$31,000 |

Sophomore Connections

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| Faculty release time | \$ 4,000 |
| GTAs (three two-semester appointments @ \$3000 each) | <u>\$12,000</u> |
| | \$16,000 |

Evaluation

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| GLA/GTA (one at \$1000 x 3 semesters) | \$ 3,000 |
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Budget Summary

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| Supplemental Instruction | \$31,000 |
| Sophomore Connections | \$16,000 |
| Assessment | <u>\$ 3,000</u> |

TOTAL: \$50,000