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**Program in Biochemistry**  
Smith College  
Northampton, Massachusetts 01063  
413-585-3806

### **The Center for Biochemistry: An Interdisciplinary Center in the Sciences**

Biochemical and molecular biological strategies have penetrated into all disciplines of the life sciences from neuroscience to environmental biology and ecology, and play increasingly important roles in disciplines such as chemistry, physics, and engineering. Technological advances have led to the use of interdisciplinary methods for answering molecular questions. Biomolecular instrumentation is complex, highly specialized and often centralized in core facilities at large universities. At Smith College, we have chosen to develop the Center for Biochemistry that extends beyond a basic core facility. The goals of the Center for Biochemistry are to expose students to cross-disciplinary teaching and research at the molecular level, support faculty in the classroom and as research mentors in current cutting-edge technology, organize and centralize resources and staff, introduce new methodologies into our lab courses in a pedagogically fruitful and time-efficient manner, and provide technical support for biochemical and molecular instrumentation.

In this proposal, the Program in Biochemistry envisions a broadening and expansion of the nascent Center for Biochemistry to more fully achieve its goals through both curricular and staffing initiatives. To accomplish these goals, we propose to increase the staff in the Center for Biochemistry from the present half-time position as an Instrumentation and Techniques Instructor (ITI) to a full time position. The expansion of this position is necessary to increase the curricular offerings within the Biochemistry Program for our majors, to expose Smith students and researchers to the latest technologies through a "cutting-edge" seminar series, to provide workshops on new technologies that will ensure extensive and effective utilization of our instrumentation in courses and independent research. These initiatives will benefit the Biochemistry Program, but also other departments such as Chemistry, Biology, Neuroscience, and Engineering that already significantly utilize the Center for Biochemistry. In addition to the backing of the faculty in the Biochemistry Program, this is an initiative that we proposed in our recent decennial review and was strongly supported by the outside reviewers.

The Center for Biochemistry already has had an auspicious start through a National Science Foundation Major Research Instrumentation Grant. Through this grant, we secured funding for a half-time Instrumentation and Techniques Instructor to facilitate the course laboratory and research uses of the new technologies, as well as the operation and maintenance of them, particularly the cutting edge proteomics instrumentation that includes a high-pressure liquid chromatography-coupled mass spectrometer (LCMS) and a high-resolution two-

dimensional gel electrophoresis system (2-D PAGE) acquired through the same grant. The College has agreed to continue this position after the expiration of the grant.

Significant interest in utilizing this equipment in the Center for Biochemistry, both in course and research, has been expressed at Smith College and from the Five Colleges. Approximately 50-80 undergraduates within the life sciences, chemistry, engineering and geology will have direct use of these instruments annually, as will at least 15-20 Smith faculty members and others in the Five College Consortium. Beyond this, the instrumentation will be used for pre-college outreach through its incorporation in the Summer Science and Engineering Program for high school women.

Because of the complex nature of the instrumentation, students and faculty require specialized training to use the equipment. This teaching would be accomplished through a specific course or by direct interactions with the Instrumentation and Techniques Instructor. By increasing the Instrumentation and Techniques Instructor position to full-time, we would be able to offer a *Molecular Biosciences Methods* course through the Biochemistry Program. This new junior/senior-level laboratory-based course will be developed in conjunction with the Center for Biochemistry, involving a two-hour lecture and a four-hour laboratory that teaches the methodologies necessary for the extraction, isolation, purification, characterization and analysis of cellular macromolecules. This course will follow a molecule from its detailed structure to its function within the cell. The methods course will be team-taught on a rotating basis and heavily supported by the Instrumentation and Techniques Instructor. The topic of the course will shift, depending on the faculty member's research expertise. For example, the course could be taught by biochemist Stylianos Scordilis and follow the development of a contractile protein such as actin from embryonic, neonatal to adult skeletal muscle. For faculty and students unable to take the course, the Instrumentation and Techniques Instructor would be able to design and implement the appropriate protocols for current and/or new areas of investigation on an individual basis.

By supporting the Center for Biochemistry at Smith College, we can ensure that students and faculty are able to maximize the effectiveness of the significant resources already in place, move into new directions by acquiring new equipment and staffing to monitor and maintain the resources, and by training members of the scientific community in how to use them. We believe that the equipment and personnel will provide the perfect medium in which to train a new generation of women scientists in state-of-the-art proteomics technologies. The new technologies and personnel in the Center for Biochemistry will help position Smith students and faculty to contribute at a national scale to some of the most pressing scientific and public health issues of our times.

On behalf of the Program in Biochemistry and the Center for Biochemistry,

Christine White-Ziegler  
Director, Program in Biochemistry  
Dept. of Biological Sciences and Program in Biochemistry

Stylianos Scordilis  
Director, Center for Biochemistry  
Dept. of Biological Sciences and Program in Biochemistry