

**New Program Proposal
Bachelor of Science
Biochemistry and Molecular Biology
University of South Carolina - Columbia**

Summary

USC-Columbia requests approval to offer a program of study leading to the Bachelor of Science degree in Biochemistry and Molecular Biology. The degree will be offered on the main campus through traditional instruction and will be implemented in Fall 2010.

The Program Planning Summary was submitted to the Commission on November 3, 2006, and reviewed and voted upon favorably without substantive comment by the Advisory Committee on Academic Programs (ACAP) on January 17, 2007. The University of South Carolina Board of Trustees approved the proposal on October 16, 2009, and the proposal was received by the Commission on November 12, 2009.

According to the proposal, the purpose of the proposed program is to provide an integrative training program for undergraduate students that combines two disciplines which underlie much of the conceptual and practical foundation of current biological, biochemical, and medical research and technology. The proposal cites a recent National Council Research report, *BIO 2010*, as the reason for the proposed program's integrative approach. The report argues that programs in the life sciences should be transformed to include a more integrated approach to quantitative and analytical disciplines to foster better understanding of the biological sciences earlier in the careers of undergraduates. As a result of the integrative approach, the proposed program will produce graduates who have the knowledge and skills to support the growth of biotechnology and health-related businesses in South Carolina and who are well-prepared for careers dominated by research and development.

The proposal states that the proposed program is needed because the rapid development of biotechnology start-up companies and their pharmaceutical counterparts, both locally and throughout the country, will require employees educated in a combined discipline. Demand for the proposed program is reflected in the strong student interest in the biochemistry/molecular biology sequence of courses in which, on average, 70 students enroll annually. Furthermore, staff research reveals that the Bureau of Labor Statistics includes both biomedical engineers and biochemists in the list of the 30 fastest-growing occupations from 2008-2018; employment positions for biomedical engineers are expected to increase by 72% while positions for biochemists (in conjunction with biophysicists) are expected to increase by 37.4% during this time. Similarly, an institutional response to staff inquiry reveals that five of the "thirty best careers" in the *US News and World Report* 2009 survey (biomedical equipment specialist; genetic counselor; physicians assistant; pharmacist; and veterinarian) are jobs that would employ biochemists or are jobs for which the Biochemistry and Molecular Biology major would be excellent preparation for required advanced study. USC-Columbia also states that a search of biochemistry/molecular biology jobs on the *Science* magazine career site shows 52 jobs within 250 miles of Columbia, 144 jobs in the Southeast, and 775 jobs in the nation, despite the depressed economy and the fact that the search was performed at the end of the traditional hiring season.

The proposal states that other institutions in the state (Clemson University, College of Charleston, Charleston Southern University, Claflin University, and Converse College) have

traditional programs in biochemistry while the proposed program requires the structural and functional integration of biochemistry and molecular biology at all levels of organization of biological organisms. No institution in the state offers a biochemistry and molecular biology program at the bachelor's degree level; two institutions, Clemson University and the Medical University of South Carolina, offer graduate degree programs in biochemistry and molecular biology.

In response to staff inquiry, USC-Columbia states that students already enrolled will comprise the majority of students enrolled in the proposed program in its initial years. In the third year of the proposed program, for example, 45 of the estimated 60 students enrolled in the program are expected to be drawn from the ranks of the existing undergraduate majors in Chemistry and Biological Sciences. The institutional response further notes that based on registration patterns in the existing Biochemistry/Molecular Biology course sequence, of the 45 currently enrolled students expected to enroll in the proposed program, 25 are expected to come from the ranks of the current Chemistry majors and 20 from Biological Sciences majors. However, according to the response, given that the Fall 2009 major headcounts for Chemistry and Biological Sciences are 266 and 1257, respectively, the loss of these students is expected to have no significant impact on the existing Chemistry and Biological Sciences programs.

The proposal states that there will be five new students (6 FTE) in the program's first year, increasing to 10 students (11.7 FTE) in the second year, and further increasing to 15 students (16.8 FTE) by the fifth year of the program. As noted earlier, an additional estimated 45 students will transfer into the new program from other existing degree programs. If enrollment and program completion projections are met, the proposed program will meet the Commission's productivity standards.

Admission to the proposed program requires that students meet the University's admission standards; complete 30 hours of coursework including the equivalent of the University's General Chemistry, Biological Principles, and Calculus I courses; and have an overall grade point average of 3.25 or higher. Once admitted, students must make satisfactory academic progress toward the degree to remain in the proposed program. The curriculum for the proposed program will consist of a total of 128 credit hours, which include general education (29-59 credit hours), biology (22 credit hours), chemistry (28 credit hours), biochemistry and molecular biology (7 credit hours), independent study or research (3 credit hours), an undergraduate seminar (1 credit hour), and elective (6 credit hours) courses. One new one-credit course will be added to the college catalog. This course, Undergraduate Seminar, is described as a survey of biochemical and molecular biology research at the University.

The proposed program's assessment plan requires students to complete all major courses and electives with a minimum grade of C and have an overall C average, successfully conduct inquiry and propose subsequent steps to solve a unique problem in a research project, and deliver an effective seminar report in both written and oral form in the Undergraduate Seminar. In addition, to determine if the proposed program effectively prepares graduates for employment and advanced study, the director of the Biochemistry and Molecular Biology degree program will administer an exit survey to graduating seniors and will also administer an alumni survey six years after graduation to collect data on student success in careers and graduate/medical school.

The proposal states that faculty for the proposed program will be drawn from existing faculty currently teaching in the Department of Biological Sciences and the Department of Chemistry and Biochemistry. Currently, 42 full-time tenured faculty members and five full-time

instructors are on staff. The proposal notes that since the majority of the courses for the proposed program are already being taught, and large increases in enrollment are not expected, no new faculty or instructors will be required. In the first year of the proposed program, two faculty members will be reassigned (0.50 FTE) to support the proposed program. In the second year, four faculty members will support the program (1.00 FTE), and in the third through fifth years of the program, six faculty members (1.50 FTE) will support the proposed program. In addition, two instructors (0.30 FTE) will be reassigned in the first through fifth years to support the proposed program.

The proposal states that no new space or facilities are needed for the proposed program. Also, according to the proposal, existing classroom space, office space, and instructional equipment at the University is sufficient for the proposed program. However, despite stating that existing equipment is sufficient, the proposal includes \$12,000 for equipment in the proposed program's estimated costs for its first five years. According to an institutional representative, these funds will be used to upgrade computing equipment needed to support the proposed program over the five-year period.

According to the proposal, the proposed program will not require additional library resources. The proposal states that the USC Library System supports teaching and research in all required subject areas, and with a collection size with over 3,500,000 volumes it is ranked 50th in North America by the Association of Research Libraries. The proposal states that the library's collection contains core titles in biology, chemistry, and biochemistry as well as in many related disciplines. The proposal notes that the library also provides access to hundreds of biochemistry and molecular biology journals such as *Annual Review of Biochemistry*, *Cell*, *Nature*, *Medicine*, and *Trends in Biochemical Sciences* through USC-Columbia's participation in the Partnership Among South Carolina Academic Libraries (PASCAL).

The proposal states that the Department of Chemistry and Biochemistry and the programs it offers are certified by the American Chemistry Society. The institution plans to seek American Chemistry Society certification for the proposed program once it is implemented.

USC-Columbia has a longstanding articulation agreement with the South Carolina Technical College System to allow technical college coursework to articulate into its baccalaureate degree programs. The proposal specifically notes that there is an excellent relationship between USC and Midlands Technical College. Because of this relationship, Midlands Technical College students will move as smoothly into the Biochemistry and Molecular Biology degree major as they do in other science programs at the University.

New costs for the proposed program are modest and estimated to begin at \$1,500 the first year and include supplies and materials (\$500) and equipment (\$1000). Estimated new costs increase to \$3,000 the second year, \$4,500 the third year, then remain at \$4,500 for the fourth and fifth year. The total estimated new costs for the program for its first five years will total \$18,000 and include supplies and materials (\$6,000) and equipment (\$12,000). Because faculty for the proposed program will be drawn from existing faculty, there is no new cost for faculty.

Shown below are the estimated Mission Resource Requirement (MRR) costs to the state and new costs not funded by the MRR associated with the implementation of the proposed program for its first five years. Also shown are the estimated revenues projected under the MRR and the Resource Allocation Plan as well as student tuition.

Estimated Program Costs and Revenue

	Estimated Program Costs		Estimated Program Revenue				
	(A) MRR Cost	(B) Other Costs*	(C) Actual State Funding	(D) Tuition	(E) Additional Revenue	(F) Total Revenue (C+D+E)	(G) Total Revenue - Total Costs (F-(A+B))
Year 1	\$59,573	\$0	N/A	\$62,877	\$0	\$62,877	\$3,304
Year 2	\$115,836	\$0	\$34,310	\$120,812	\$0	\$155,122	\$39,286
Year 3	\$167,134	\$0	\$66,678	\$175,211	\$0	\$241,889	\$74,755
Year 4	\$167,134	\$0	\$96,456	\$175,211	\$0	\$271,667	\$104,533
Year 5	\$167,134	\$0	\$96,456	\$175,211	\$0	\$271,667	\$104,533

*Includes costs of an extraordinary nature not otherwise included in the MRR cost calculation (e.g., costs for a new building required to support a program).

These data show that if the institution meets the projected student enrollments and contains costs as they are shown in the proposal, the proposed program will be able to cover costs beginning in the first year and thereafter.

In summary, USC-Columbia proposes to offer a program of study leading to the Bachelor of Science degree in Biochemistry and Molecular Biology. The proposed program will provide an integrative program that combines biochemistry and molecular biology to prepare students for employment in the fields of biology, chemistry, biochemistry, and medical research and technology and for advanced study in fields such as the sciences, medicine, and veterinary medicine. This proposed program is needed given the expected increase in demand for graduates with this combined knowledge and the fact that no institution in the state currently offers a baccalaureate degree in Biochemistry and Molecular Biology.

Recommendation

The Committee on Academic Affairs and Licensing commends favorably to the Commission the program leading to the Bachelor of Science degree in Biochemistry and Molecular Biology at USC-Columbia, to be implemented in Fall 2010, provided that no "unique cost" or other special state funding is requested or required.