

## **Program Planning Summary**

**Proposal Designation:** Bachelor of Science Degree in Applied Biotechnology;  
120-122 semester credit hours

**Proposed date of implementation:** Fall Semester 2008

**Sites:** SC Technical Colleges and Clemson's main campus

### **Justification of the Proposed Program:**

The proposed project is a futurist approach to solving workforce needs by creating associate and baccalaureate degree programs that articulate with the research emphases of the Clemson University and the economic development plans of South Carolina. The proposed applied biotechnology degree will address new workforce needs as defined by Clemson University's research emphasis areas and cluster industries identified by Michael Porter, the Palmetto Institute and other state reports. The program has the potential to build on the Pathways to Prosperity legislation that proposes cluster education in K-12. Students in K-12 who select clusters in biotechnology would be a future candidate for the proposed programs which builds on a collaborative arrangement between the SC Technical College System and Clemson.

The unique nature of the proposed applied biotechnology degree is the design to articulate seamlessly with the technical colleges and to deliver the final two years of the program on site at the technical colleges. The University is working with the SC Technical College System and individual colleges who will develop and propose the associate degree component for their campus.

When finally implemented, the SC two-year technical campuses and Clemson will offer programs that include certificates, two-year Associate Degrees, and a four-year Baccalaureate Degree. The result will be a well-trained workforce to enter all levels of the Biotechnology industry.

The location of the program at the technical college sites is important and will allow non-traditional students to stay in school and continue their education while working in the industry. The Technical College System of South Carolina will provide infrastructure on-site for the University to use, including classrooms and laboratories. The Technical College will continue to advise students so that a consistent approach can be provided for students as they move through their educational experience with minimal disruption. Students must apply and meet Clemson admission standards for acceptance into the program after completing the first two years of the program.

The justification of the collaborative work between the SC Technical College System and Clemson University is to support economic development in South Carolina by preparing a knowledge-based workforce. As South Carolina's efforts to attract new industry to the state expand, it is important for the state to be able to prepare technicians (two-year degrees) and technologists (four-year degrees) who are able to expand their capabilities to meet the needs of industry. The new technologist will have advanced skills and knowledge of the basic sciences underpinning industry research and manufacturing. The technologist will be able to critically think and reason, solve complex problems, communicate technical knowledge effectively, act as a leader, and create new knowledge through recognizing and acting on good ideas.

Universities, such as Clemson, must look towards new paradigms for educating its students. The options for new paradigms range from articulated two-four year degree programs, on-campus and off-campus programs, and technology enhanced delivery. Student needs are also shifting, with more non-traditional students seeking research university education. It is not always possible that a non-traditional student can enroll in classes on Clemson's campus. However, the student can attend classes at a campus closer to home, for example, a technical college, and still retain their present employment.

AdvanceSC funded two grants to explore the development of creative educational programs within South Carolina. Clemson received limited funds to conduct Assessment of the interest and viability of an applied biotechnology degree and the SC Technical College System received a grant to support curriculum development and equipment. A joint Industry Advisory Board was developed, faculty teams identified, and core competencies identified. We have conducted a state-wide survey of existing Biotechnology related industries and met with many representatives of industry to discuss the core competencies needed by industry. Industry has unanimously supported this proposed program and has made suggestions for courses to be included in the curricula, both for the two-year and four-year programs.

The proposed baccalaureate degree will build on more than job skills, incorporating core general education requirements, critical thinking and problem solving with basic biotechnology skills. The majority of the upper division content courses will be transmitted from Clemson's campus to the participating Technical College campuses. Macromedia Breeze allows for two-way visual and sound communication. Lectures will be delivered live and recorded for web access for those students who might not be able, because of their work schedule, to view a lecture live. Both Clemson and the Technical Colleges have the necessary hardware and software to allow for the delivery of quality lectures. When appropriate, qualified faculty in the community will be hired by Clemson to conduct the laboratory components of the Clemson program. There are no effective distance technologies to teach the laboratory skills required in this program.

Because the lectures will be generated from campus, we propose that the degree program can also be offered on Clemson's main campus as well as at any SC Technical College site with adequate enrollment. This will allow traditional students on the Clemson campus access to the program as well.

### **Anticipated program demand and productivity**

It is anticipated that the initial enrollment into the Clemson's third and fourth year will be 10-15 students. The majority of these students will come from two-year programs from the following participating technical colleges: Greenville, Tri-County, Piedmont, and Trident. Greenville Technical College has 12 students currently enrolled in their Associate Degree Program. It is anticipated that the two-year program will be initiated at other Technical College campuses as funding becomes available.

Two surveys of High School Science Teachers, one at the Clemson Biology Merit exam and the other at the South Carolina Science Council Annual Meeting, indicate enthusiasm and support for the two-year and four-year programs. Teachers were asked to indicate the content and skill levels of their students who might enter our program. The results suggest that students will be well prepared to enter our program.

**The extent to which the proposed program duplicates existing programs in the state:**

Currently no state supported institutions in South Carolina offer a BS in Applied Biotechnology or related areas. Claflin University does offer a bachelor of science in biotechnology. Greenville Technical College has an approved associate degree which will link to the proposed program.

**Relationship of the proposed program to existing programs at the proposing institution:**

The BS in Applied Biotechnology will not duplicate but complement several current and proposed programs at Clemson. These include the Biotechnology option in Bio Systems Engineering, the proposed BS in Forensic Science, the Industrial Microbiology option in Biological Sciences and the proposed 3+2 MS degree in Biotechnology.

**Relationship of the proposed program to other institutions via inter-institutional cooperation:**

This program represents a collaborative effort with the South Carolina Technical System. Greenville Technical College has the first approved Associate Degree in Biotechnology. Their curriculum was developed with input from faculty at Clemson and other Technical Colleges. This will serve as our model for seamless articulation with Clemson. It might be necessary for students from two-year Associate Degree programs to take additional courses before acceptance to Clemson if the student does not enter the associate degree when he/she first enters college. Students applying for the BS program must meet the same requirements as any transfer student and will pay Clemson tuition and fees for Clemson courses.

As previously mentioned, SC Technical Colleges will provide classroom and laboratory space for many of the courses in our curriculum. Several are using grant funds to purchase the necessary equipment to support their courses as well as Clemson's. In addition to Clemson faculty, competent Technical College faculty will be hired by Clemson to teach many of the courses in our BS curriculum. Many of these will be laboratory courses using the above facilities.

**Total costs associated with the program:**

All costs for the program will be generated by student tuition and laboratory fees. The costs of the program include lab instruction at the technical college, faculty coordinator for the program, and administrative support. In order to be cost neutral, a minimum of five students must be enrolled at a technical college site.

