

## Objectives

The Professional Science Master's in Biotechnology at the University of Delaware was established in 2010 to train students in the advanced biological topics necessary to have a comprehensive understanding of modern life science research, provide exposure to related fields such as bioengineering, statistics, chemistry and bioinformatics and foster an understanding of business/organizational management issues. The goal of the program is the development of graduates poised to enter positions in diverse biotechnology industries.

At that time the provisional program was approved, the rationale for establishment included; 1) Enhancement of professional education at the university in line with Objective III of the "Path to Prominence." 2) Meeting an identified need for professional training in biotechnology at the Masters level in the region, 3) Increasing graduate enrollment in biotechnology-related courses at the university, some of which were undersubscribed. The program was primarily intended to meet the needs of full-time students interested in pursuing a career in the biotechnology industry, with plans to increase flexible course scheduling to accommodate working professionals. The original goal was to admit 10 new students per year into the program from outside the university.

The original proposal describes UD as uniquely positioned to offer the Professional Master's Degree in Biotechnology due to the existing strength of the faculty, UD's history of commitment to biological science and the biotechnology industry and the characteristics of the region. In particular, several UD research centers, institutes and alliances are mentioned (Center for Translational Cancer Research, the Avian Biosciences Center, the Center for Biomedical (now Biomechanical) Engineering Research, Delaware Biotechnology Institute and Delaware Health Science Alliance). In addition, the proposal cites strong projections for bioscience job growth and associated economic impact and longstanding relationships with bio-related industries in the region.

## Current Program

The program consists of 42 credits of biological science, biotechnology-related and business-related coursework, and including a 6-credit internship. The internship typically consists of a seven-month, full-time experience at a biotechnology company, jointly supervised by a UD faculty member and a company representative and serves as the capstone experience for the students. Admissions requirements are similar to those for the other graduate programs in the biological sciences.

Since the program began, 195 students have applied, 91 have been admitted and 19 have matriculated. Six of the matriculated students have graduated, four transferred to other programs in Biology, two withdrew and seven are currently enrolled. Of the six that have completed the program, five found biotechnology-related employment upon graduation and the sixth entered a PhD program at UD. An industrial advisory board has been formed and met in 2013.

## Assessment

The subcommittee has reviewed the self-study, application for permanent status, as well as the original application for provisional status and support letters from affected departments and units. The subcommittee feels that the program is rigorous and sets high standards appropriate for graduate and professional education at the University of Delaware. The subcommittee was also favorably impressed by the successful placement of the graduates of the program. In addition, we feel it is a positive development that a number of students have chosen to pursue academic graduate degrees. The advisory board, faculty, graduates and students express that they value the program overall.

The subcommittee notes that the enrollment numbers (19 in 4 years) are about half of the goal set forth in the original application for provisional status (10/year). In addition, it appears that none of the enrolled students have been working professionals seeking part-time education. In addition, the self study points out that the enrolled students often have difficulty in finding appropriate internships

The subcommittee noted that the program requires a significant commitment of time for students (42 credits, including a 7-month internship) and this may be an obstacle to recruitment, especially for part-time students. However, we also noted that this level seems to be needed for recognition (and possible eventual accreditation) by the National Professional Science Master's Association (NPSMA).

## Recommendations

The subcommittee recommends permanent status for the Professional Science Master's in Biotechnology at the University of Delaware. Furthermore, assuming permanent status is obtained, the subcommittee recommends the program director pursue recognition and eventual accreditation from the National Professional Science Master's Association (NPSMA).

Regarding internships, the subcommittee feels that the program director should partner with the companies on the advisory board to increase internship possibilities through the establishment of more formal internship programs for students. Since these companies have been identified as interested in increasing the number of prospective employees ready for the biotechnology industry, they should be willing to provide internships for the program students. Statistics in the self-study indicate that a significant percentage of graduates from the program start their post-graduation career with the company for which they interned.

In addition, the program could grow by an organized recruitment effort targeting working professionals from these companies. Part-time students would not have difficulty finding an internship opportunity at their place of employment. Part-time students would generally be less sensitive to tuition pressures.

Other organizations mentioned in the proposal (Christiana Care, Delaware Health Alliance) might also be able to help in this regard.

Given that there is some interest from students in the ELI CAP program, it might be beneficial to work with ELI to develop a pre-PSM program to improve the students' science, technical and business English.