HECB FORM 1

**PLANNING NOI Cover for:**
Master of PHARMACEUTICAL BIOENGINEERING

## Program Information

Program Name: Pharmaceutical Bioengineering (Department of Bioengineering)

Institution Name: University of Washington, Seattle

Degree Granting Unit: College of Engineering and School of Medicine
*(e.g. College of Arts and Science)*

Degree: Master of Pharmaceutical Bioengineering Level: Master's Type: N/A
*(e.g. B.S. Chemistry)* *(e.g. Bachelor)* *(e.g. Science)*

Major: Pharmaceutical Bioengineering CIP Code: 14.0501
*(e.g. Chemistry)*

Minor: N/A
*(if required for major)*

Concentration(s): N/A
*(if applicable)*

Proposed Start Date: Autumn 2009

Projected Enrollment (FTE) in Year One: 20 *(# FTE)* At Full Enrollment by Year: 2011: 34 *(# FTE)*

Proposed New Funding: $171,207.21
Funding Source: ☐State FTE ☒ Self Support ☐ Other

## Mode of Delivery

Single Campus Delivery Seattle
Off-campus Delivery Downtown Seattle UWEO facility (primary delivery location)
Distance Delivery Adobe Pro Connect and Presenter

## Substantive Statement of Need

*See attached*

## Contact Information (Academic Department Representative)

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Endorsement by Chief Academic Officer Date 1/15/05

**Substantive Statement of Need**

## I. Degree Program Description and Rationale

The Master of Pharmaceutical Bioengineering will be a hybrid delivery program offered by the University of Washington's Department of Bioengineering and administered by UW Educational Outreach. Students will be working professionals employed in life science industries such as biotechnology or pharmaceuticals who wish to explore advanced post-baccalaureate education in the following areas: pharmaceutics, molecular bioengineering, molecular biology, drug discovery and design, regulatory affairs, experimental design, statistics, controlled release and drug delivery, biometrics, biochemistry, molecular genetics, systems biology, drug discovery and translational pharmaceutical bioengineering science (bridging the gap between research and process development for manufacturing). Course content will be delivered via traditional classroom-based lecture/discussion in the evenings as well as lecture/discussion online using tools such as the Adobe Pro Connect and Presenter. The hybrid delivery format will work well for this professional audience since many will be balancing full time jobs and families along with this program. The program requires students to complete a minimum of 40 graduate credits over three years. Upon completion of the program, graduates receive a Master of Pharmaceutical Bioengineering from the University of Washington. The program will be split out into stand-alone certificates as well for those focused professionals who do not wish to pursue the Master's degree. These certificate options position the University of Washington to meet the needs of an expanded group of adult learners in Washington who are focused on professional development in the biotechnology industry.

## II. Relationship to Institutional and Unit Priorities

The Bioengineering Department's mission is "to serve a worldwide leadership role in bioengineering research, education, service, clinical applications and technology transfers." The Pharmaceutical Bioengineering program will support the mission and values of Bioengineering since the department values its commitment to a diverse group of learners and fosters strong ties to the commercial and medical communities. By serving the biotechnology and pharmaceutical workforce in Washington State, Bioengineering will continue to partner with companies in the area to shape the face of healthcare in Washington State in the future. By working with the community and fostering the continuing education needs of professionals, the program will also support the University's values, which focus on integrity, diversity, excellence, collaboration, innovation and respect. This program will help the community, the state of Washington, as well as adult learners outside of our state. For example, many employers in the area have multiple facilities across the nation and globe that could benefit from the education the program provides. The program can be delivered in a classroom and also have content captured online to serve a broader audience and help the University meet its goals to enrich lives of people both in our community and outside our state borders. The university is also committed to serving diverse learners and our nontraditional adult learners in the program will be well-served. Our students will want to engage in education while working full time and sometimes maintaining families as well. Our

format will cater to a large audience and facilitate continuing education opportunities for those citizens that cannot attend campus full time.

## III. Demand

A survey of Puget Sound life science businesses was administered by the UWEO market research team to gauge corporate support and student interest for the program. Following the survey, leaders in biotechnology and pharmaceutical companies in the area were invited to join the advisory board for the program.

In the survey research project that followed, two groups were proposed as the principal target audiences for the investigation:

1) UW alumni of pharmacy, biology, bioengineering, chemistry, chemical engineering, biotechnology, and related undergraduate majors, as well as UWEO alumni from the Biomedical Regulatory Affairs and Clinical Trial certificate programs, who graduated within the past 5 years
2) Selected companies (employers and their employees) from the Puget Sound Business Journal annual Biotechnology company list as well as an additional list of company contacts provided by the UWEO marketing group

**Alumni/Employee Survey**

- Most respondents were employed at biotech or research institutions. More than half of the respondents were interested in this program, showing a strong demand
- "Hybrid delivery with some online and some classroom with instructor" was a preferred delivery format
- Majority of respondents agree that it's valuable to offer each of the degree program course series as a certificate program so that they could have more options.
- Majority of respondents who took the survey offered their contact information to receive further updates for the program

**Employer Survey**

- Employers surveyed indicated that they currently rely more on in-house mentor-based training for company employee professional development.
- Both employer and alumni indicate a strong preference for a Master's credential.
- Most companies surveyed indicated that they would like to have both certificate program options as well as the Master's program option to better serve the various needs of company-wide employees.

**Summary and recommendation**

- The survey results demonstrate a unique value of this program to employees in the biotech industry with a training background in biology, biochemistry and bioengineering.
- Certificate program options are a must for this Master's program to succeed, as supported strongly by findings from both alumni and employer survey.
- Overall, market research results show a strong employee demand for this Master's program in Pharmaceutical Bioengineering.

**IV. Relationship to other institutions**

Educational programs in the U.S. offered by peer institutions were researched and their curricula were analyzed in the development of the Pharmaceutical Bioengineering program. Biotechnology-related programs at Johns Hopkins, University of Pennsylvania, Northwestern University, University of Wisconsin and Harvard Extension offered the most interesting comparisons because these programs were offered as part-time programs for working professionals. Other programs were identified as well; however, most of the other programs were full time programs with no or very limited options for students who also work full time.

**V. Relationship to HECB Master Plan; State and Regional Needs Assessment**

The University of Washington does not currently offer a part time program well-suited for professionals interested in career advancement in the biotechnology or pharmaceutical industry in our region and beyond. The Pharmaceutical Bioengineering program will be self-sustaining and will not receive state funding support. Courses in the program are to be offered in the evenings and online to offer accessibility to working adult learners. This program provides an opportunity for life science professionals to earn an advanced degree in an area that contributes directly to the state's economy. Washington hosts a growing number of biotechnology, pharmaceutical and medical device companies that employ citizens and promote research and educational development in the Pacific Northwest. This program serves the needs of these employers while also supporting the goals of state initiatives such as the Governor's Life Sciences Discovery Fund and Innovation Partnership Zones.

Amgen is a global biotechnology company with R&D and manufacturing facilities in Seattle and Bothell. Amgen's University Relations Committee has collaborated actively with UW to define the need for continuing education opportunities for biotechnology employees. Amgen's support of the Pharmaceutical Bioengineering program reflects the following:

- Employers in our region are focused on the capture and retention of high quality employees.
- Employers can provide professional development opportunities for their employees while the employees continue to work full time for them.
- Employees can expand their exposure to the overall goals of their company/organization, become more valuable to the organization, and explore career development paths created by the expanded knowledge base they gain
- Employers find it valuable to their organization to develop effective upstream and downstream communication, i.e. (1) how to have different types of scientists find a common "language" across the company so all employees are on the same page and understand the process of effective drug development (2) How can various functional groups perform better across the organization, e.g. how can R&D employees more effectively work with process development teams to streamline drug discovery, development, manufacture. Different teams within organizations need a fundamental understanding of what other teams do to help the company function optimally. This promotes creativity and product development, and helps

companies bring products to market more quickly, save costs and continue to function successfully in our region.

**VI. Curriculum**

The program is comprised of three sets of course series; each series will also be offered as a certificate program. Students enroll in the program for nine consecutive quarters.

I. **Basic Bioscience:** This series would serve as the foundation core curriculum that all students in the program would take. The five core courses that make up the focus of the program are two courses in molecular biology, two in general pharmaceutics and one in statistics/experimental design. No matter what educational background or experience, all program students would benefit from these courses. The courses would also bring all program students up to the same level in preparation for advanced topics in the specialized tracks of study.

II. **Drug Discovery Track and Translational Pharmaceutics Track:** After Basic Bioscience, students could choose from two specialized tracks to finish the credit load required for the Master's degree. One track focuses on the drug discovery process and includes coursework in cell culture, drug discovery and design, molecular targets and drug classes, and systems biology and bioinformatics. The other track focuses on the downstream processes involved in translational pharmaceutics and includes coursework in preclinical development, clinical development, formulation and delivery, and process development. If students have no experience in the biotechnology or pharmaceutical industry, they may choose to pursue studies in both of the specialized tracks. If students have experience in one area of specialization, they may opt to pursue studies in the opposite track to round out their professional experience. For maximum flexibility, within each track there would be two required courses the students would have to take, and then students could choose their remaining two courses from either track to individualize their study program.

III. **Bioengineering Departmental Seminars:** The department would have students participate in departmental seminars for credit. These seminars are captured for online viewing so students would have the option to come to campus for the seminars or view them online. Seminars expose students to cutting edge research in university laboratories. Seminars also allow them to "bond" with peers and faculty members in their home department.

Students would be required to complete 40 graduate credits to obtain the degree. All students would be required to pursue:

| Track | Credits |
|---|---|
| Basic Bioscience | 20 |
| One of the Specialized Tracks | 16 |
| Bioengineering Department Seminars | 4 |
| Total | 40 |

The 40-credit degree path will be ideally suited for those professionals who work in the biotechnology industry currently. Since they will have experience in one of the

specialized tracks, they may choose to focus on the other track to complete their experience. Some may choose to select courses from both tracks to benefit their own career pathway.

There will also be those students who do not have experience in the industry. These students may choose instead to complete all 56 graduate credits that comprise the degree curriculum. These students would instead choose:

| Track | Credits |
|---|---|
| Basic Bioscience | 20 |
| One of the Specialized Tracks | 16 |
| The other Specialized Track | 16 |
| Bioengineering Department Seminars | 4 |
| Total | 56 |

Students who enroll in this program may work in a laboratory environment; however, there may also be students who do not work in biotechnology who could benefit from practical application of course concepts. Therefore, Bioengineering is currently evaluating the inclusion of an optional capstone project for those students who do not have practical experience in laboratory or research environments. For students who do not have such experience, working with a faculty member on a project will provide a deeper connection to the academic materials presented in class discussions.

Students in the program will have bachelor's degrees from accredited institutions in a science or engineering discipline. Applicants to the program would also be considered with education or professional experience in health sciences, business or law. Students could include those who are new to the industry as well as those who are changing their career path or are taking on additional and/or new responsibilities and roles. Ideally students will have professional experience under their belt by the time they apply to the program. In this manner, students can form a mature cohort in which their professional experience enhances classroom discussion and fosters a deeper learning environment. The program targets working adults in the early- to mid-stages of their careers. It is anticipated that the majority of those students employed in biotechnology already will be receiving partial or full support from their employers while some students coming from smaller companies or companies from other industries will be self-supporting. For example, Amgen has indicated that they would financially support employees who chose to pursue the Master's degree program.

**VII. Faculty Profile**

UWEO and Bioengineering currently collaborate on the successful Master of Medical Engineering program. The Medical Engineering program began as one certificate in 1996 and in 1998 expanded to a Professional Master's program. Enrollments in the Master of Medical Engineering program are strong and interest in both the degree and certificate options for that program indicate that adults in the Puget Sound are very interested in pursuing career paths in Washington's biotechnology and biomedical industries. UWEO and Bioengineering can draw upon their experience with that program to effectively implement and deliver the Pharmaceutical Bioengineering program.

As in Medical Engineering, the program faculty will be a combination of teaching faculty and industry practitioners. The program will be directed by Dr. Patrick Stayton, Professor of Bioengineering. He will contribute to the direction of the program and his compensation for these efforts will come from the program budget. Faculty from Bioengineering will be invited to teach in the program, as well as faculty from other departments on campus. For example, faculty or lecturers from the School of Pharmacy would be invited to teach in the program. Industry professionals would add invaluable practical input to this curriculum and would be invited to teach in this program as well. Bioengineering would approve all instructional appointments in the program.

**VII. Resources/Infrastructure**

UWEO will designate a program director and a program coordinator to be the primary liaisons for UW Bioengineering in the degree program partnership. The UWEO program director works with the department chair, faculty, academic staff and department program director to ensure the program is implemented in a manner that achieves the schools or colleges academic, student services and fiscal goals. The UWEO program coordinator works with degree program students, department coordinators and program advisors to ensure course logistics and registration proceed smoothly.

The UWEO program director and coordinator draw upon centralized program management resources along with UW and UWEO operational units. UWEO's services include:

- Public relations for the program
- Market research, if necessary
- Marketing and promotion
- Dedicated marketing web site for program (degree and certificates)
- Student recruitment
- Building and coordinating an advisory board under Bioengineering's direction
- Troubleshooting operational issues
- Budgeting and pricing, under UW Bioengineering guidance
- Facilitating classroom assignments
- Paying of faculty and other program costs
- Financial accounting services for the program
- Delivering online exit surveys annually for each course series
- Student registration and tracking
- Risk management
- Funding resources during dedicated program development periods
- Specialized handling of students who elect to pursue certificates rather than degree; these students may require more services from UWEO, e.g. enrollment advising through UWEO's certificate enrollment advising group