



COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

OFFICE OF ACADEMIC
PROGRAMS AND RESEARCH

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October 5, 2009

TO: Melinda K. Duncan.
Professor and Graduate Program Director
Department of Biological Sciences
University of Delaware

FROM: Dr. Jack Gelb, Chair, Department of Animal and Food Sciences *JG*
Dr. Doug Tallamy, Chair, Department of Entomology and Wildlife Ecology *DT*
Dr. Tom Ilvento, Chair, Department of Food and Resource Economics *ti*
Dr. Blake Meyers, Chair, Department of Plant and Soil Sciences *BM*
Dr. Tom Sims, Deputy Dean, College of Agriculture & Natural Resources *Tom Sims*

SUBJECT: Support for Professional Science Masters in Biotechnology

Thank you for providing us the opportunity to review the proposed Professional Science Masters Program in Biotechnology. We have carefully reviewed the rationale, admissions requirements, proposed curriculum, and degree requirements for this program, including the courses recommended or required from our departments. The courses selected from each of our departments are appropriate, offered regularly, and we welcome the enrollment of PSM students in them in the future.

We fully support the proposed PSM in Biotechnology and look forward to contributing to the success of this program. Please don't hesitate to contact us if there is any way that we can help with the implementation of the PSM for the University of Delaware.

cc: Robin Morgan, Dean of the College of Agriculture and Natural Resources

UNIVERSITY FACULTY SENATE FORMS

Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: Melinda K. Duncan phone number 0533

Action: Request for New Graduate Degree "PSM in Biotechnology"
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term 010J
(use format 04F, 05W)

Current degree _____
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degrees of: PSM (Professional Science Master's)
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed names: Professional Science Master's (PSM) in Biotechnology
Proposed new name for revised or new major / minor / concentration / academic unit
(if applicable)

Revising or Deleting:

Undergraduate major / Concentration: _____
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor: _____
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change: _____,
(Attach your Graduate Program Policy Statement)

Graduate Program of Study: _____
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration: _____

List program changes for curriculum revisions: N/A

List new courses required for the new or revised curriculum:
BISC872, MAST697, MAST698, BUAD500

Other affected units:
ANFS, BUAD, UAPP, MISC, ENTR, PLSC, MAST, CHEM, HESC, ENWC, CISC, CHEG, CPEG, ELEG, MEEG, NURS, PHYT, STAT. The chairs of all affected units have been contacted and given approval.

Rationale:

(Explain your reasons for creating, revising, or deleting the curriculum or program.)

Professional Science Master's (PSM) degrees have been developed by the Council of Graduate Schools in conjunction with the Sloan Foundation to fill a need for workers trained at an advanced level in the Sciences whose background is broader than that found in the graduate of a traditional MS program. PSMs are designed as terminal degrees serving a similar role to the MBA degree for business graduates, by providing a comprehensive science curriculum that trains graduates to work in interdisciplinary teams that are expected to function in a business setting. The Professional Science Master's in Biotechnology seeks to train students in the advanced biological topics necessary to have a comprehensive understanding of modern life science research, provides exposure to related fields such as bioengineering, statistics, chemistry and bioinformatics and trains students to think about business/organizational management issues. The course work requirements of the degree are integrated by a "capstone" experience, which in most cases is expected to consist of an internship in a business setting. The target audience for this degree is expected to be diverse and will include both full-time students and part-time students who currently hold full-time employment in the field.

Program Requirements:

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the present curriculum.) **See attached**

See Attached.

ROUTING AND AUTHORIZATION: (Please do not remove supporting documentation.)

Department Chairperson _____	Date _____
Dean of College _____	Date _____
Chairperson, College Curriculum Committee _____	Date _____
Chairperson, Senate Com. on UG or GR Studies _____	Date _____
Chairperson, Senate Coordinating Com. _____	Date _____
Secretary, Faculty Senate _____	Date _____
Date of Senate Resolution _____	Date to be Effective _____
Registrar _____	Program Code _____
Vice Provost for Academic Programs & Planning _____	Date _____
Provost _____	Date _____
Board of Trustee Notification _____	Date _____

Resolution for the Faculty Senate Agenda (if a resolution is required)

WHEREAS, the proposed Professional Science Master's (PSM) in Biotechnology is an interdisciplinary graduate course of study covering the scientific underpinnings of the biotechnology revolution, the management of the interdisciplinary teams necessary to bring biotechnology advances to the marketplace and the ethical/regulatory issues pertinent to these technological advancements and

WHEREAS, there has been much interest over several years from individuals with diverse backgrounds and interest in pursuing advanced graduate studies in biotechnology relevant to the business environment, and

WHEREAS, the experience of the Department of Biological Sciences with graduate level training in the life sciences in collaboration with Departments ranging over all seven Colleges of the University of Delaware provide existing courses and a foundation for the program, and

WHEREAS, the proposed program contributes to three milestones on the University's "path to prominence": to become a premier research and graduate university; to achieve excellence in professional education; and the engaged university, be it therefore

RESOLVED, that the Faculty Senate recommends approval provisionally, for five years, the establishment of a new major leading to the Professional Science Master's in Biotechnology, effective June 1, 2010.

Graduate program proposal

Professional Science Master's in Biotechnology

I. DESCRIPTION

Professional Science Master's (PSM) degrees have been developed by the Council of Graduate Schools in conjunction with the Sloan Foundation to fill a need for workers trained at an advanced level in the Sciences whose background is broader than that found in the graduate of a traditional MS program. PSMs are designed as terminal degrees serving a similar role to the MBA degree for business graduates, by providing a comprehensive science curriculum that trains graduates to work in interdisciplinary teams that are expected to function in a business setting. The Professional Science Master's in Biotechnology seeks 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 course work requirements of the degree are integrated by a "capstone" experience which in most cases is expected to consist of an internship in a business setting. Students completing the program will have a broad exposure to both the scientific underpinnings of biotechnology and how these are applied practically in industrial settings and will be well prepared to take on diverse roles in the biotechnology industry. This will be assessed by both surveys of students and internship mentors and long term tracking of career trajectories (see assessment plan for more detail)

II. RATIONALE AND DEMAND

A. Institutional factors.

1. In May of 2008, the University of Delaware unveiled its "Path to Prominence" strategic plan. Objective III of the strategic plan it to achieve "Excellence in Professional Education" to meet the needs of a world where a bachelor's degree is no longer enough. In fall 2009, President Harker has highlighted the Professional Science Master's initiative as important progress towards the Excellence in Professional Education objective during town hall meetings with UD faculty (see Powerpoint presentation at <http://www.udel.edu/udaily/2010/sep/townhalls091509.html>).
2. The planning process began in late fall of 2008 in consultation between the Graduate Program Director of Biological Sciences, Melinda K. Duncan Ph.D., members of the Delaware Bioscience Industry Association and John Sawyer Ph.D., current Associate Provost for Professional Education, UD about the need to professional training opportunities in biotechnology at the Masters level in the

State of Delaware. Drs. Duncan and Sawyer applied for and were awarded a program development grant from the Delaware Valley Innovation Network in March of 2009. Since then, the curriculum has been designed in consultation with an industrial advisory board comprised of managers based in Delaware biotechnology industries, onsite discussions with mid-level managers at local biotechnology companies, the faculty of the Department of Biological Sciences, the chairs of the Departments of Computer science and Chemistry as well as the Dean's and the chairs of affected Departments from the Colleges of Health Sciences, Agriculture and Natural Resources, Arts and Sciences, Alfred Lerner College of Business and Economics, Engineering, Education and Public Policy, and Earth, Oceans and Environment

3. The impact of this program on University programs will be to increase the enrollment in graduate courses in biotechnology related fields and it will require the offering of business related content. Commitments have been obtained from all affected units to provide this.
4. The proposed curricula would more fully utilize existing resources since it will provide enrollment for some currently undersubscribed courses in the life sciences, particularly those taught outside of the College of Arts and Sciences.

B. Student demand

1. The current goal is to enroll 10 new graduate students per academic year in this program. The enrollment numbers are derived from inquiries of potential applicants to the Department of Biological Sciences seeking such programs and discussions with leaders in Delaware Biotechnology industry. These students are projected to be new to the university since this program will address currently unfulfilled demand for a program that provides training at the interface between science and business.
2. This curriculum is primarily intended to meet the needs of full-time students who desire Master's level training to prepare them for careers in biotechnology industry. However, efforts are ongoing to move a significant proportion of the content to evening or online offerings to meet the needs of working professionals.

C. Transferability

We expect few to no students to transfer into this from other UD degree programs, although students pursuing graduate certificates, particularly the biotechnology certificate, will be encouraged to enroll. All applicable UD coursework taken as a student

in other programs will transfer to this degree as long as it has not counted towards another UD degree. The exception is that all coursework applied to UD graduate certificates (that has not been applied to a degree) will be fully applicable to the PSM in Biotechnology.

D. Access to graduate and professional programs

N/A

E. Demand and employment factors

This degree seeks to prepare students for employment in the Biotechnology industry. The Delaware Valley Innovation Network Talent Gap Analysis for Delaware Valley Biotechnology industry (published Winter 2009, see <http://www.delawarevalleyinnovationnetwork.com/reports/gap-analysis>) has identified a need to increase the number of qualified biotechnology workers able to fill jobs in the growing biotechnology sector. This report also states that local industry currently has difficulty finding employees that have a strong, diverse scientific background coupled with communication, teamwork, leadership and business skills. The PSM in Biotechnology seeks to fill this gap.

F. Regional, state, and national factors

1. There are currently no comparable courses of study offered by any university in The State of Delaware. Both the Department of Biological Sciences University of Delaware and Department of Biological Sciences/Biotechnology, Delaware State University, offer MS degrees in Biological Sciences. However, neither existing program requires the business/scientific teamwork-leadership coursework of the Professional Science Master's and neither requires an industrial internship. The National Professional Science Master's Association lists 35 programs nationwide in biotechnology related fields. The only programs in our geographic area are George Washington University, Northeastern University, Pennsylvania State University, St. Johns University, State University of New York at Brockport, and University of Connecticut. There are no established programs in the Delaware Valley. The closest similar programs that are recognized Professional Science Master's degrees are located at Temple University and Thomas Jefferson University (Philadelphia, Pennsylvania), The University of Maryland, Baltimore County (Baltimore, Maryland) and The University of Maryland, University College (Adelphi, Maryland). Of these, the only the Maryland schools have Professional Science Master's in Biotechnology programs. The geographic distance between Baltimore and Delaware makes these programs very inconvenient for part-time students living and working in Delaware. Further, the

Maryland programs primarily serve the needs of Baltimore/Washington corridor biotech employers and would not draw new talent into the Delaware talent pool accessible to Delaware biotech employers.

2. There is no existing accrediting body for these types of program beyond the university level accreditation of Middle States. However, The Council of Graduate Schools formally recognizes Professional Science Master's programs. The National Professional Science Master's Association (NPSMA) is a collaboration of Professional Science Master's degree program directors, faculty, administrators, alumni, and students that supports PSM degree initiatives. The NPSMA publishes guidelines and best practices for PSM programs. The program has been designed to meet the recognition requirements (see <http://www.sciencemasters.com/PSMAffiliation/HowtoApplyforPSMAffiliation/tabid/116/Default.aspx>). Further, the curriculum has been designed both in consultation with our industrial advisory board and other interested biotechnology industry representatives from the State of Delaware. This is a requirement for PSM recognition and ensures that students completing the program will have skills that meet the needs of potential employers. Upon program approval by the University of Delaware, we will seek recognition as a Professional Science Master's program from the Council of Graduate Schools. NPSMA is currently investigating accreditation for such programs and may become the accrediting body for PSM programs. Once accreditation standards are developed, UD will apply for that accreditation. John Sawyer is the University of Delaware representative to the NPSMA. Upon recognition of PSM programs at Delaware, the University will become an institutional member.

G. Describe other strengths

1. The University of Delaware is uniquely positioned to offer the Professional Science Master's degree in Biotechnology. Our focus reflects the academic strengths of our Faculty, our longstanding and ongoing commitment to biological sciences and the biotechnology industry, our existing and developing partnerships, and the unique characteristics of the region.
2. Strong research capabilities in Biotechnology and Bioinformatics at Bio-related research centers at the University of Delaware such as the *Center for*

Translational Cancer Research, the Avian Biosciences Center and the Center for Biomedical Engineering Research.

3. ***Delaware Biotechnology Institute:*** The institute was established in 1999 to promote research, education, and technology transfer for biotechnology applications to the benefit of the environment, agriculture, and human health.
4. ***Delaware Health Sciences Alliance:*** A partnership between the *University of Delaware, Thomas Jefferson University, Christiana Care Health Systems, and The Nemours Foundation/Alfred I. DuPont Hospital for Children*, to support joint and collaborative education, research, public outreach, and student internships.
5. The Delaware Valley region is a major center of biosciences industry.
6. 11.5% of new jobs in the Delaware Valley region are in the biosciences.
7. Every new biosciences job in the region supports 3.7 additional jobs.
8. Longstanding relationships with key bio industry companies such as ***AstraZeneca and DuPont.***
9. Melinda Duncan and John Sawyer obtained a Department of Labor grant through the Delaware Valley Innovation Network to develop this program. In doing so we partnered with the Delaware Biosciences Association (DBA) to build the Industry Advisory Board for the program. DBA and several members of the industry advisory board will partner with the University of Delaware to provide internships and experiential learning opportunities for students in the program. The Office of Graduate and Professional Education is currently working to specify the form of the internships and the formal structure of these relations to assure that we will secure ample meaningful internships for the students.
10. An engaged industrial advisory board representing both small and large biotechnology firms with a presence in Delaware including; Siemens, DuPont, Thermo-Fisher, Fraunhofer, Incyte, Noramco, and WL Gore.

III. ENROLLMENT, ADMISSIONS AND FINANCIAL AID

- A. The current enrollment goal is to admit 10 students per year into the program with a total of 20 students enrolled at any one time. This limit is based on the availability of seats in the graduate level classes and faculty/staff time available to provide appropriate academic advisement. If the program is successful and proves very popular in the future, it would be possible to admit additional students although additional faculty teaching and faculty/staff administrative resources would need to be identified to do so.
- B. Admission Requirements

Applicants will be selected based on undergraduate and any prior graduate transcripts, letters of recommendation, strength of prior experience in the field, the GRE, and the TOEFL if applicable. See graduate program policy for details.

C. Student Expenses and Financial Aid

1. The majority of student financial support for this program is provided from the student's resources supplemented through traditional financial aid mechanisms including loans.

D. Institutional Factors

Students completing this program will receive the Professional Science Master's (PSM) degree. This is the appropriate form of recognition since it is distinctly different from traditional MS programs in that it 1) is intended to be a terminal degree 2) combines both science and business training 3) includes a required industrial internship experience.

E. Describe the curriculum

The PSM in Biotechnology requires 42 credits of graduate level course work consisting of:

- 1) 12 credits of graduate level course work in the biological sciences comprised of at least one course in each of three of the five following areas: Molecular Biology, Genetics, Cell Biology, Physiology and Microbiology (see list below)
- 2) 9 credits of graduate level courses in fields related to biotechnology including bioinformatics, engineering, chemistry, agriculture, food safety, health sciences and statistics (see approved list below). One class must be from the category "statistics" unless the student has prior coursework in statistics. This determination is made by the program director.
- 3) 15 credits of "Plus" courses, one from each of the following five categories: ethics, intellectual property/legal regulatory affairs, survey of business or public administration, leadership and organizations, and project management/decision making (see below).
- 4) Six credits of BISC 872, internship. The experiential portion of this class will in most cases be completed during a 7 month long, full-time internship at a biotechnology company and be supervised jointly by a representative of the host company and a University of Delaware faculty member. Students pursuing the PSM degree who have significant prior bench experience will be encouraged to focus their capstone on improving a company's business/management plan or moving a newly developed product to market. Such projects could include; an analysis of how to bring a product to market, how to improve team interactions between company groups or how to scale up a research project to commercial scale. Students pursuing the PSM degree without prior experience working at the bench will be encouraged to focus their capstone on a specific scientific research question. Such projects could include: testing methods to increase production of recombinant proteins, testing the specificity of antibodies being developed or direct research product development. The capstone is assessed by the quality of the work performed at the internship and two written reports 1) a plan of work outlining the background of the project, the learning objectives for the internship and goals to be accomplished developed in consultation with and approved by both the faculty and internship mentors and 2) a scholarly paper outlining

the objectives of internship, what was accomplished on each objective and recommendations for future work. Internships may be full-time or part-time depending on the schedule/needs of the student and employer. Internships may be paid or unpaid with the final grade based on the written reports and mentor evaluation. Students who are employed in the field of biotechnology are encouraged to develop their capstone projects at their place of employment as part of a professional development plan, however the expectation is that the “capstone” will be different than the student’s normal job responsibilities.

Please see the attached graduate program policy for full details of the curriculum:

V. RESOURCES AVAILABLE

A. Learning Resources

See attached library assessment statement

B. Faculty / Administrative Resources

The program administrator is Melinda K. Duncan, Ph.D., Tenured Full Professor and Graduate Program Director, Department of Biological Sciences. She has been involved in the administration of graduate programs in Biological Sciences for the past 11 years and has served as the Biological Sciences Graduate Program Director since 2005. The coordination of the Plus curriculum and internships will occur in collaboration with John Sawyer, Ph.D., Tenured Full Professor, Department of Business Administration, Associate Provost for Professional Education. Drs. Duncan and Sawyer previously developed a joint Ph.D. in Biological Sciences/MBA program which graduated its first student in May 2009.

C. External Funding

Drs. Duncan and Sawyer have received funding from the Delaware Valley Innovation Network to provide the initial resources necessary to develop this proposal. A grant to fund part of the initial startup of the program is in preparation for submission to the National Science Foundation

VI. RESOURCES REQUIRED

A. Learning Resources

The learning resources necessary for basic implementation are generally in place in the form of existing graduate classes in the biological science and related fields. However, the Lerner College of Business is developing BUAD500, “Survey of Business” to provide the prerequisite training necessary to complete the “Plus” curriculum. In order to compete for both the highest caliber of student and to fulfill the needs of the part-time

student population in the future, additional sections of the most popular graduate classes will need to be offered after normal working hours, more courses will need to be developed in fields relevant to biotechnology industry such as fermentation, legal issues in biotechnology, and biotechnology business administration, and the University Office of Financial Aid will need to be more responsive to the needs of tuition paying graduate students.

B. Personnel Resources

The Department of Biological Sciences is currently very short of full time faculty to cover existing undergraduate and graduate course offerings. For this program to succeed and expand in the future, additional faculty members qualified to teach graduate courses relevant to biotechnology will need to be hired. In some cases, such faculty could be on supplemental contracts, however, full time faculty members are preferred to ensure the academic rigor of the program.

C. Budgetary Needs

Since the PSM in Biotechnology is a program with interdisciplinary coursework spread over all seven UD colleges, the tuition for students enrolled in the program will need to be apportioned to fairly compensate all participants. The budget policy for PSM programs is currently under negotiation among the College Deans since all seven UD colleges provide course content to this program.

The initial proposal from the Department of Biological Sciences is below:

- 1) 20% of tuition shall be for program administration including staff time, computer support, program marketing & recruiting, office supplies, teaching buyout and/or salary for the program administrator, etc.
- 2) The remaining 80% of tuition for classes taken outside of the College of Arts and Sciences will be sent to the College teaching the class.
- 3) The exception to this policy is the tuition generated due to BISC872, internship. Mentoring of student internships will be time intensive for faculty members and there is currently no incentive for faculty members to take on this responsibility either in the Collective Bargaining Agreement or in contributions to faculty research programs. In order to provide faculty with incentives to perform this critical role, 60% of tuition generated for BISC872 will be returned to the faculty member mentoring the internship in a professional development account. The remaining 20% of the tuition will be retained in the College in which the faculty member holds primary appointment.

VII. IMPLEMENTATION AND EVALUATION

A. Implementation Plan

All classes for the program are either existing or are currently submitted to the challenge list for permanent numbers to be in place by fall 2010. The program will seek to quickly market the program immediately after program approval is obtained in order to matriculate at least a small class for fall 2010. At this time, the program director will identify faculty members willing to serve as faculty advisors/internship mentors. The program director in collaboration with John Sawyer, Associate Provost for Professional Studies and the Office of Graduate and Professional Studies, will develop a pool of prospective industrial internship mentors.

B. Assessment Plan

Assessment plan PSM in biotechnology				
Objectives	Strategic Activities	Measures	Short-term Outcomes	Long-term Impact
1. Train students in life science disciplines pertinent to biotechnology	recruit excellent applicants and matriculate students with credentials similar to those in the existing departmental graduate programs	Number and demographic data of student applicants and matriculated students.	Retention and time to degree statistics	Students gain employment in biotechnology related fields
	Course work covering the disciplines of cell biology, molecular biology, genetics, microbiology, physiology	Faculty evaluation of student progress in course work Survey of internship mentors Surveys of graduate students in the program and post-graduation	Course work for the PSM degree helped students secure biotechnology related internships and initial employment	Graduates enjoy long term success in biotechnology careers
	Course work covering biotechnology related disciplines including agriculture, chemistry, engineering, health sciences, statistics, lab science	Surveys of students focusing on their experiences in these classes Surveys of graduates to determine the utility of these classes to their career Faculty evaluation of student progress in course work Interviews and surveys of internship mentors	Course work for the PSM degree helped students secure biotechnology related internships and initial employment Students and graduates report applying knowledge from courses to work settings	Graduates enjoy long term success in biotechnology careers

2. Provide training in science related business, organizational management, legal issues, project management and ethics	course work addressing these issues and industrial internship experience	Surveys of students focusing on their experiences in these classes Surveys of graduates to determine the utility of these classes to their career Faculty evaluation of student progress in course work Interviews and surveys of internship mentors	Course work for the PSM degree helped students secure biotechnology related internships and initial employment Students and graduates report applying knowledge from courses to work settings	Graduates enjoy long term success in biotechnology careers
3. Provide experiential training in biotechnology industry to prepare students for the expectations of the workplace	Internships in biotechnology related industrial settings	Surveys of students focusing on their experiences in their internship Surveys of graduates to determine the utility of their internship experience to their career Faculty and internship mentor evaluation of both the internship work and the written products Interviews and surveys of internship mentors	Internship prepares students for the biotechnology workplace and helps them secure their first post-graduation position	Graduates enjoy long term success in biotechnology careers

Program improvement will be an ongoing process. The results of the assessment measures will be shared with both the Industrial Advisory Board for the PSM in Biotechnology and the Graduate Affairs Committee, Biological Sciences. The curriculum will be modified as necessary to achieve the goal of producing graduates who apply the knowledge, skills and abilities gained from the PSM in biotechnology to their career.

VIII. APPENDICES

- A. Graduate Program Policy
- B. Accreditation Criteria (if appropriate)
- C. Letters of Collaborative Agreement
- D. Letters of Approval from Contributing Departments
- E. Other Pertinent Documents

Professional Science Master's (PSM) in Biotechnology Program Policy

Part I. Program history

A) Statement of purpose and expectations for graduate study

The Professional Science Master's in Biotechnology seeks to provide advanced, interdisciplinary didactic coursework in the life sciences, training in business applicable to scientific industry and experiential training in an industrial setting. Graduates will be poised to enter positions in diverse biotechnology industries.

B) Date of permanent status- pending

C) Degrees offered Professional Science Master's (PSM) in Biotechnology

Part II. Admission

A) Admission requirements

Admission to the PSM in Biotechnology requires a prior scholastic index (grade point average on a 4.0 point scale) of at least 2.8 overall and 3.0 in the sciences. Those who meet the stated minimum requirements are not guaranteed admission, nor are those who fail to meet all those requirements necessarily precluded from admission if they offer other appropriate strengths.

There is also the possibility of entering the program after the successful completion of two courses of the Biological Sciences core with a grade of B or better (not B-) as a continuing education student and the achievement of an overall GPA of 3.0 in graduate classes attempted. Students may also be admitted after successful completion of the "Certificate in Biotechnology".

Applicants who are not U.S. citizens or permanent residents must complete the Test of English as a Foreign Language (TOEFL) with a score of 550 or higher on the paper-based test or 79 or higher on the Internet-based test. Previous education, training or residence in the U.S. does not exempt foreign nationals from these requirements. Requests for a waiver of the language test requirements (for example, for students from English-speaking countries outside of the U.S., or for foreign students who have a college degree from a U.S. institution) must be approved by the University of Delaware Office of Graduate Studies. Students who need further training in English prior to attending graduate school may apply for admission through the University of Delaware English Language Institute's Conditional Admission Program
http://www.udel.edu/eli/programs_grad_cap.html.

The Graduate Record Examination is required of all applicants to the PSM in Biotechnology including those who have successfully completed the "Certificate in Biotechnology".

B) Prior degree requirements

BA or BS degree, preferably in a science or engineering discipline

C. Application deadlines.

Fall admission: Full consideration deadline: January 15th with rolling admission to continue until May 1st for foreign nationals and July 1st for US citizens/permanent residents.

Spring Admission: Full consideration deadline: October 1st with rolling admission to continue until November 1st for foreign nationals, December 15th for US citizens/permanent residents.

D. Special competencies needed

Applicants are required to have completed, at the undergraduate level, the following (or the equivalent): two years of biological sciences; one year of mathematics, preferably to include calculus and/or statistics; one year of college physics; one year of general chemistry; and one course in organic chemistry.

E. Admission categories.

Provisional admission may be offered with the stipulation that any deficiency in undergraduate training be made up (without graduate credit).

Students with TOEFL scores below the minimum required for admission may be considered for conditional admission if they enter the University of Delaware English Language Institute's academic English program.

F. Other documents required

Applications must also include three letters of recommendation from persons able to judge the applicant's ability to pursue graduate study, a resume or CV outlining work and/or academic experience in the field of biotechnology as well as an application essay consisting of the answers to the following questions:

1. What scientific research/employment experience have you had? Please be specific about the field of work and job responsibilities
2. What are your long-term professional objectives?
3. What specific attributes of our Department and the PSM in Biotechnology make you feel that this degree is appropriate to help you achieve your professional objectives?

G. University statement:

Admission to the PSM in Biotechnology program is competitive. Those who meet stated requirements are not guaranteed admission, nor are those who fail to meet all of those requirements necessarily precluded from admission if they offer other appropriate strengths.

Part III. Academic

A. Degree Requirements

1. List course requirements

The PSM in Biotechnology requires 42 credits of graduate level course work consisting of:

- 1) 12 credits of graduate level course work in the biological sciences comprised of at least one course in each of three of the five following areas: Molecular Biology, Genetics, Cell Biology, Physiology and Microbiology (see list below)
- 2) 9 credits of graduate level courses in fields related to biotechnology including bioinformatics, engineering, chemistry, agriculture, food safety, health sciences and statistics (see approved list below). One class must be from the category "statistics" unless the student has prior coursework in statistics. This determination is made by the program director.
- 3) 15 credits of "Plus" courses, one from each of the following five categories: ethics, intellectual property/legal regulatory affairs, Survey of business or public administration, Leadership and organizations and Project management/decision making (see below).
- 4) 6 credits of BISC 872, internship. The experiential portion of this class will in most cases be

completed during a 7 month long, full time internship at a biotechnology company and be supervised jointly by a representative of the host company and a University of Delaware faculty member. Students pursuing the PSM degree who have significant prior bench experience will be encouraged to focus their capstone on improving a company's business/management plan or moving a newly developed product to market. Such projects could include; an analysis of how to bring a product to market, how to improve team interactions between company groups or how to scale up a research project to commercial scale. Students pursuing the PSM degree without prior experience working at the bench will be encouraged to focus their capstone on a specific scientific research question. Such projects could include: testing methods to increase production of recombinant proteins, testing the specificity of antibodies being developed or direct research product development. The capstone is assessed by the quality of the work performed at the internship and two written reports 1) a plan of work outlining the background of the project, the learning objectives for the internship and goals to be accomplished developed in consultation with and approved by both the faculty and internship mentors and 2) a scholarly paper outlining the objectives of internship, what was accomplished on each objective and recommendations for future work. Internships may be full-time or part-time depending on the schedule/needs of the student and employer. Internships may be paid or unpaid with the final grade based on the written reports and mentor evaluation. Students who are employed in the field of biotechnology are encouraged to develop their capstone projects at their place of employment as part of a professional development plan, however the expectation is that the "capstone" will be different than the student's normal job responsibilities.

The program will make every effort to assist students with identifying internship opportunities and negotiating internship plans. However, students bear significant responsibility in this process as well and failure to either identify an internship and/or formulate an acceptable internship plan by the end of the student's third semester of full time study (or completion of 33 credits of course work) is considered failure to make satisfactory progress towards degree.

Biological Sciences (12 credits, four classes; must include classes from at least three of the five following categories)

Cell Biology	Credits
BISC 612- Advanced Cell Biology	3
BISC 625- Cancer Biology	3
BISC 671- Cellular and Molecular Immunology	4
PLSC635- Plant Developmental Biology	3
Genetics	Credits
BISC 654- Biochemical Genetics	3
BISC 656- Evolutionary Genetics	3
BISC 693- Human Genetics	3
PLSC 636- Advanced Plant Genetics	3
PLSC 605- Plant breeding	3
Microbiology	Credits
ANFS 635- Animal Virology	3

ANFS 639- Food Microbiology	3
BISC 641- Microbial ecology	3
BISC 682- Bacterial Pathogens; molecular mechanisms	3
BISC 645- Bacterial Evolution	3
BISC 679- Virology	3
PLSC 619- Soil Microbiology	4
PLSC 629- Introduction to Fungi	4
MAST 618- Marine microbial ecology	3

Molecular Biology **Credits**

ANFS 670- Principles of Molecular Genetics	3
BISC 602- Molecular Biology of Animal Cells	3
BISC 665- Advanced Molecular Biology and Genetics	3
CHEM642- Biochemistry II	3

Physiology **Credits**

BISC 605- Advanced Mammalian Physiology	3
BISC 615- Vertebrate Developmental Biology	3
BISC 675- Cardiovascular Physiology	3
HESC 651-Neurophysiological Basis of Human Movement	3
HESC 654- Survey of Medical Physiology	3

Biotechnology-related science courses (three courses from the following list adding up to at least 9 credits, one must be from the category “statistics” unless the student has documented prior exposure to statistical analysis of data)

Agriculture/food science: **Credits**

ANFS 628- Food Chemistry	4
ANFS 629- Food Analysis	4
ANFS 633- Poultry pathology	3
ANFS 636- Immunology of domestic animals	3
ANFS 637- Avian immunology	3
ANFS 645- Food engineering technology	3
ANFS 649- Food biotechnology	4
ANFS 654- Advanced ruminant nutrition	3
BREG 603/PLSC 603- Soil physics	3
ENWC 611- Insect pest management	3
ENWC 610- Medical, Veterinary, and forensic entomology	3
ENWC 619- Biological control	3
ENWC 805- Insect-plant chemical ecology	3

Bioinformatics: **Credits**

ANFS 644- Bioinformatics	3
CISC 636- Introduction to bioinformatics	3
CISC 637- Database Systems	3
CISC 681- Artificial Intelligence	3
CISC 683- Introduction to data mining	3
CISC 841- Bioinformatics	3

MAST 697- Bioinformatics programming for Biologists	3
MAST 698- Environmental and systems bioinformatics	3

Chemistry/Biochemistry	Credits
CHEM 641- Biochemistry	3
CHEM 645- Proteins, Structure and Function	3
CHEM 646- DNA-Protein Interactions	3
CHEM 649- Molecular Biophysics	3
CHEM 653- Bioinorganic Chemistry	3
CHEM 681- Green Chemistry	3

Engineering:

CHEG 617- Colloid science and engineering	3
CHEG 620- Biochemical Engineering	3
CHEG 621- Metabolic engineering	3
CHEG 625- Green Engineering	3
CHEG 649- Molecular Biophysics	3
CHEG 650- Biomedical Engineering	3
CHEG 805- Multidisciplinary biotechnology	3
CPEG 630- Neurons and networks	3
ELEG 643- Biomedical Nanotechnology	3
ELEG 670- Biophysics of excitable membranes	3
ELEG 671- Introduction to biomedical engineering	3
ELEG 675- Image processing with biomedical applications	3
ELEG 678- Introduction to nano and biophotonics	3
ELEG 679- Introduction to medical imaging systems	3
MEEG 612- Biomechanics of human movement	3
MEEG 682- Clinical biomechanics	3
MEEG 683- Orthopedic Biomechanics	3
MEEG 684- Biomaterials and tissue engineering	3
MEEG 685- Control of human movement	3
MEEG 686- Cell and tissue transport	3

Health Sciences

BISC 600- Biotechnology and molecular medicine	3
HESC 601- Research Methods	3
HESC687- Nursing Sciences Research	3
NURS 621- Advanced pathophysiology	3
NURS 622- Advanced pharmacology	3
NURS 638- Health sciences evaluation	3
PHYT 809- Psychosocial Aspects of Health and Disease	3
PHYT 606- Research	3
PHYT 623- Clinical Neuroscience	3

Advanced Laboratory Techniques

BISC 601- Immunochemistry	4
BISC 604- Nucleic Acids Laboratory	4
BISC 619- Gene Expression Laboratory	4

Statistics/data analysis:

BISC 643- Biological Data Analysis	3
CHEG 604- Probability and statistics for engineering	3
STAT 608- Statistical Research Methods	3
STAT 609- Regression and Experimental Design	3
STAT 611- Regression Analysis	3
STAT 615- Design and Analysis of Experiments`	3
STAT 616- Advanced Design of Experiments	3
STAT 617- Multivariate Analysis	3
STAT 619- Time Series Analysis	3
STAT 620- Nonparametric Statistics	3
STAT 621- Survival Analysis	3
STAT 656- Biostatistics	3
STAT 674- Applied Data Base Management	3
STAT 675- Logistic Regression	3

PSM Plus component (15 credits):

Whereas students in Professional Science Master's Programs may have professional goals that would lead them into business and industry, or to government or non-profit employment, the University of Delaware offers two tracks for the PSM PLUS component.

PSM students will take at least 15 credits of PLUS coursework in addition to their science core. The University recommends the student follow one of the tracks below, however students may cross over tracks to fit their interest.

Business/industry track	Government/non-profit track
Survey of Business (3 credits)	Survey of Public Administration (3 credits)
BUAD 500- Survey of Business*	UAPP 803- Seminar in Public Administration
Leadership and Organizations (3 credits)	Leadership and Organizations (select 1, 3 credits)
BUAD 870- Leadership and Organizational Behavior	UAPP 835- Organizations and Management
	UAPP 604- Leadership in Organizations
Project Management, Operations or Entrepreneurship (select 1, 3 credits)	Managerial Decision Making or Financial Management (select 1, 3 credits)
BUAD 835- Managing New Product Development Projects	UAPP 819- Management Decision Making in Public & Nonprofit
BUAD 831- Operations Management and Management Science	UAPP 833- Financial Management in Public and Nonprofit Sectors
BUAD 871- Managing for Creativity and Innovation	UAPP 827- Program and Project Analysis
ENTR 860- High Tech Entrepreneurship	UAPP 829- Taxation and Fiscal Policy
MISY 840 -Project Management and Costing	

Intellectual Property (3 credits)	Legal and Regulatory Affairs (3 credits)
CHEG 595- Intellectual Property for Engineers and Scientists	UAPP 646- Administrative Law and Policy
Ethics (3 credits):	
BISC 631- Practice of Science	UAPP 648- Environmental Ethics
BUAD 840- Ethical Issues in Global Business Environments	UAPP 650- Values Ethics and Leadership

*BUAD500 meets prerequisites for BUAD835, BUAD831 and BUAD871

2. Advisement All students will develop a plan of study in consultation with their advisor upon matriculation into the program.

3. Give procedure for petitions for variance in degree requirements (e.g., course substitution policies, completion deadlines, etc.)

All petitions for course substitutions and variances in the completion deadlines must be made to the Graduate Affairs Committee, Department of Biological Sciences.

4. Define any grade minimums in courses that are different from University policy.

Only graduate courses completed with a grade of B or higher fulfill the biological sciences core and the biotechnology-related course requirements including the internship for the PSM in Biotechnology. Students receiving a B- or lower in a required core course are subject to dismissal from the program. However, they may file an appeal to the Department of Biological Sciences Graduate Affairs Committee for approval to retake the course and remain in the program. If the appeal is not approved, the Graduate Affairs Committee will recommend to the Office of Graduate Studies that the student be dismissed from the program.

Students must also earn a minimum index of 3.0 in all “plus” component courses attempted to earn the PSM in Biotechnology, and no course with a grade below a C- may be counted toward the degree.

5. Identify any courses, which may not be used towards the degree.

Only courses listed in the curriculum may count towards the degree unless a variance is granted by the Graduate Affairs Committee, Department of Biological Sciences.

6. Identify expectations of facility of expression in English (oral and written) as part of the degree requirement.

While there are no specific requirements, successful completion of the degree will require fluency in both written and spoken English.

B. Committees for exams, thesis, or dissertations

This degree has no thesis or dissertation requirements. The director of the program will compile a list of University of Delaware faculty members who are willing serve as academic advisors for

PSM Biotechnology students. Students will select advisors from this list who have expertise most appropriate for their career interests within the first two weeks after matriculation. The academic advisor in consultation with the program director will provide guidance on course selection and the academic advisor will also be responsible helping the student formulate the expectations for their internship experience and for evaluating the student's capstone internship report.

It is highly encouraged that part-time students working in biotechnology-related fields work with both their UD academic advisor and employer prior to matriculation to develop a comprehensive professional development plan that coordinates PSM Biotechnology degree requirements with work responsibilities.

C. Timetable and definition of satisfactory progress towards the degree

1. Academic load

Full-time students will enroll in at least 9 credits of classes per semester (fall and spring), however, in order to complete the degree in two years, the student will need to enroll in 12 credits of classes at least two semesters. Part-time students are expected to enroll in at least one class per regular academic semester to remain matriculated in the program and are expected to complete their degree within five years.

Time line for degree:

Semester 1- enroll in 9 credits of coursework

Semester 2- enroll in 12 credits of coursework

Semester 3- enroll in 12 credits of coursework

Winter after semester 3- begin internship

Semester 4- enroll in BISC 872 internship and single remaining didactic course (Plus course taken during evening hours, 9 credits)

Summer after semester 3- sustaining status, complete internship and final report, graduate

Normal progress towards degree is reviewed for all students in the program at the end of every academic semester and is assessed based on grades, participation in program activities and performance in the internship.

2. Grade requirements (general and specific).

Only graduate courses completed with a grade of B or higher fulfill the biological sciences core and the biotechnology-related course requirements for the PSM in Biotechnology. Students must also complete BISC872, internship with a grade of at least B. Students receiving a B- or lower in a required core course are subject to dismissal from the program. However, they may file an appeal to the Department of Biological Sciences Graduate Affairs Committee for approval to retake the course and remain in the program. If the appeal is not approved, the Graduate Affairs Committee will recommend to the Chair of the Department of Biological Sciences that the student be dismissed from the program.

Students must also earn a minimum index of 3.0 in all "plus" component courses attempted to earn the PSM in Biotechnology.

All graduate courses successfully completed with a B or higher that were applied towards earned graduate certificates, but not graduate degrees, at the University of Delaware will be directly applicable to the PSM in Biotechnology.

3. Thesis/dissertation progress timetable guidelines.

N/A

4. Thesis/dissertation defense guidelines.

N/A

5. Forms required.

The application for advanced degree must be filed with the Office of Graduate studies prior to the beginning of the last semester in the program

6. Identify consequence for failure to make satisfactory progress.

Students failing to make satisfactory progress towards degree will be identified by the Graduate Affairs Committee, Department of Biological Sciences, in consultation with the student's academic advisor/program director. Recommendations for dismissal are made by the Department Chair of Biological Sciences to the University of Delaware Office of Graduate studies.

Students who feel that they have been graded inappropriately or receive what they perceive as an unfair evaluation by a faculty member may file grievances in accordance with University of Delaware policies. Students are encouraged to contact the Department's Graduate Program Director prior to filing a formal grievance in an effort to resolve the situation informally.

Part IV. Assessment Plan

Consistent with the Mission Statement presented earlier in this document, five student learning goals are defined. Students will:

1. Have advanced knowledge of the discipline of biotechnology
2. Have experience working with interdisciplinary teams on biotechnology
3. Achieve competence in scientific communication
4. Be knowledgeable in scientific business ethics
5. Understand the application of business/management theory to science

The specific goals stated above are mapped to various science and PLUS courses in the program Assessment Plan which guides program evaluation and is filed with the Center for Educational Effectiveness.

These goals are assessed through multiple indicators including:

- Faculty evaluation of student progress in course work
- Survey of internship mentors
- Surveys of students and program alumni
- Faculty and internship mentor evaluation of the internship work and written products
- Employer surveys

Both short term and long term impacts are assessed.

Part V. Financial aid-

Students enrolled in this program are responsible for their tuition and living expenses. Both the Department of Biological Sciences and University of Delaware Office of Financial Aid will provide assistance in identifying suitable fellowships, grants and loans to help finance their education.

Part VI. Departmental Operations

A. General student responsibilities

Access to Student Records

Students wishing to review their Departmental file must submit a written request to the Graduate Program Director at least 24 hours in advance. Students must review the file in the presence of departmental staff or faculty and are not permitted to remove a file from Wolf Hall but may photocopy documents from their folder. All access to student records is in accordance with the

Standards of Student Conduct

A) Academic honesty

All graduate students are subject to University of Delaware regulations regarding academic honesty.

B) Laboratory Safety and Research Regulations

Graduate students performing laboratory research are subject to all University regulations regarding safety, use of human subjects and animals, and hazardous/radioactive material use and disposal. These guidelines may be found in the University of Delaware Policies and Procedures Manual. Students participating in off campus internship experiences are expected to fully comply with all safety regulations of the workplace.

C) Contact information

It is the responsibility of all students to ensure that their contact information on file with the university is current (mailing address, phone number, email address). It is also the student's responsibility to regularly monitor their email, phone and mail for important notices regarding their enrollment.

D). Departmental facilities

Occasionally student's graduate assistantship or other assignments may require the use of departmental laboratories or other facilities. Keys to laboratories, etc., are maintained in the Department office and will be issued based on faculty and Department Chair approval. Any assignments that require the expenditure of departmental funds (e.g. data collection activities) require departmental approval in advance and are processed through the department in which the work is to be done.

B) Guidelines for Formal CGS Recognition as a Professional Science Master's (PSM) Program

The Professional Science Master's (PSM) degree is a unique professional degree grounded in science and/or mathematics and designed to prepare students for a variety of career options in business, government, or non-profit organizations. The degree combines advanced coursework in science and/or math with an appropriate array of professional skill-development activities to produce graduates highly valued by employers and fully prepared to progress toward leadership roles. The PSM is designed to be self-contained and is not a traditional master's degree earned en route to or from a PhD degree.

The following criteria are intended to provide guidance to faculty and institutions planning new PSM programs, or to assist leaders of existing programs who feel their programs meet the criteria to be recognized as a PSM or who wish to modify their programs in order to be recognized as a PSM. The following criteria are deemed important for a master's program to qualify for PSM status.

- A majority of program course work in graduate-level science and/or mathematics courses in one or more disciplines. An interdisciplinary curriculum is highly desirable.
- A professional skills component (often called the "plus" component of a "science-plus degree") that may consist of a variety of relevant courses and activities developed in consultation with prospective employers. Examples include business basics, legal and regulatory issues, finance and marketing, communication and teamwork, and are often developed in collaboration with appropriate academic units outside the sciences or taught by adjunct faculty from the targeted employment sector. In addition to courses and workshops, professional skills are usually enhanced by internships and problem-based projects sponsored by employers. The professional component should result in a portfolio of experiences recognized by and involving the client employers.
- Program quality assurance should be provided using the faculty-based mechanisms normally used by the institution for graduate programs in order to ensure institutional integration and sustainability. It is understood that the professional nature of the program may lead to substantial participation by non-academic practicing professionals, for example as adjunct faculty course instructors or student internship mentors.
- An active and engaged employer advisory board. Examples of board and/or individual-member functions include providing advice on the program curriculum, assisting with internships and placement, assisting with project-identification, and/or interacting individually with students.
- A commitment to report enrollment and degrees annually and an attempt to track the employment history of every graduate in order to help assess program outcomes and success.
- Agreement to use the name "Professional Science Master's" and the PSM logo on Websites and advertising brochures. In turn the program will be listed on CGS national PSM websites and data bases, and will be included in CGS PSM promotional activities.

In order to use the trade-marked title and logo "PSM" institutions must apply to the Council of Graduate Schools for recognition as a PSM by addressing each of the above stated criteria and by submitting an application to profmasters@cgs.nche.edu.

C) Letters of Support

College of Agriculture and Natural Resources

Thomas Sims, Ph.D., T. A. Baker Professor of Soil and Environmental Chemistry Associate
Dean for Academic Programs & Research

Department of Entomology and Wildlife Conservation, Judy Hough-Goldstein, Ph.D., Professor
and Chair

Department of Food and Resource Economics, Thomas Ilvento, Ph.D., Professor and Chair

Department of Plant and Soil Sciences, Blake Meyers, Ph.D. Professor and Acting Chair

Department of Animal and Food Sciences, Jack Gelb, Ph.D., Professor and Chair

College of Arts and Sciences

Department of Computer and Information Sciences, B. David Saunders Ph.D., Professor and
Chair

Department of Chemistry and Biochemistry, Klaus Theopold, Ph.D., Professor and Chair

College of Earth, Ocean and Environment

School of Marine Science and Policy, Charles E. Epifanio, Ph.D., Interim Director and
Harrington Professor of Marine Science

College of Engineering

Thomas Buchanan, Ph.D. Deputy Dean of Engineering, Professor of Mechanical Engineering

Department of Chemical Engineering, Norman Wagner, Alvin B. and Julia O. Stiles Professor
and Chairperson

Department of Mechanical Engineering, Anette M. Karlsson, Ph.D. Associate Professor and
Interim Chair

Department of Electrical and Computer Engineering, Gonzalo Arce, Charles Black Evans
Professor and Chair.

College of Health Sciences

Department of Physical Therapy, Stuart A. Binder-Macleod, PT, Ph.D., FAPTA, Edward L.
Ratlidge Professor and Chair

Department of Health Nutrition and Exercise Sciences and School of Nursing, James G.
Richards, Ph.D. Deputy Dean, College of Health Sciences

Alfred Lerner College of Business and Economics

Department of Accounting and Management Information Systems, Dr. Guido L. Geerts,
Professor and Chair

Department of Business Administration, Dr. Rick L. Andrews, Deputy Dean Lerner College of
Business and Economics, Chair Department of Business Administration

School of Urban Affairs and Public Policy

Maria P. Aristigueta, Professor and Director, School of Urban Affairs and Public Policy

University of Delaware Library

Susan Brynteson, Vice Provost and May Morris Director of Libraries

Howie, Cheryl

From: Shenkle, Cynthia W.
Sent: Thursday, October 15, 2009 9:42 AM
To: Howie, Cheryl
Subject: FW: PSM and certificate in Bioinformatics
Attachments: 10_16certificateinbiotechnologysubmittedtocollegerevision.docx; 10_16PSMbiotechnologyapprovalformforcollegerevision.docx

Importance: High

Hi, Cheryl. Can you please replace the PSM and certificate materials on the 10/19 Ed. Affairs agenda with the materials attached when you return on Monday?

Thank you.

Cindi

-----Original Message-----

From: Shenkle, Cynthia W.
Sent: Thursday, October 15, 2009 9:32 AM
To: 'Melinda K. Duncan'
Cc: Doren, Douglas J.; Howie, Cheryl; Anthony Seraphin
Subject: FW: PSM and certificate in Bioinformatics

Hi, Melinda. Thank you for your message. Actually it would not be expected that you would attend the Ed. Affairs meeting but you would be contacted afterwards if there are any questions and you would definitely be invited to the College Senate meeting where these would be voted on. A potential schedule would be as follows: the proposals reviewed at Ed. Affairs on 10/19; proposals reviewed and voted on at College Senate on 11/16. You will be contacted after the 10/19 meeting to let you know if your proposals were approved. I think that Dean Doren will be attending the 10/19 meeting of Ed. Affairs, too. I've cc'd him here so that he can look over the revisions suggested by Mary Martin.

Thanks again, and we'll be in touch soon.

Cindi

Cynthia Shenkle
Assistant Dean
College of Arts and Sciences
University of Delaware
219 Mitchell Hall
Newark, DE 19716
(ph) 302-831-3020
(fax) 302-831-4358

-----Original Message-----

From: Melinda K. Duncan [mailto:duncanm@UDel.Edu]
Sent: Wednesday, October 14, 2009 6:33 PM
To: Shenkle, Cynthia W.
Subject: PSM and certificate in Bioinformatics

Hi Cindy,

Here are slightly revised applications for the biotechnology graduate degrees compared to those brought over as hard copies on Monday. Mary Martin sent me additional comments this afternoon which I incorporated into these versions. They change nothing substantive, they just cover the legalities a little better. Just to confirm, should I plan on attending the academic affairs committee meeting this Monday and if so, should I plan on coming at a particular time?

Melinda

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