

# 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:** \_\_\_Dan Simmons\_\_\_\_\_phone number\_\_8547\_\_\_

**Action:** \_\_\_Request for New Master of Science (MS) Degree Program 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** \_\_\_08F\_\_\_\_\_

(use format 04F, 05W)

**Current degree** \_\_\_\_\_

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

**Proposed change leads to the degrees of:** \_\_\_MS\_\_\_\_\_

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

**Proposed name:** \_\_\_Master of Science in Biotechnology\_(MS 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:

**This is a new Master of Science degree in Biotechnology. It is specifically designed for students who complete the BS degree in Biological Sciences with a concentration in Biotechnology. These students will be able to obtain an MS degree in as little as one year from the date of matriculation.**

### List new courses required for the new or revised curriculum:

(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter "None")

None

**Other affected units:**

(List other departments affected by this new or revised curriculum. Attach permission from the affected units. If no other unit is affected, enter "None")

None

**Rationale:**

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

**Many students in the BS degree in Biological Sciences with a concentration in Biotechnology are engaged in independent research during their undergraduate years and have obtained substantial results. The rationale is that about another year of course work and research after graduation would add significantly to their productivity and development as scientist and potentially qualify them for a Master's degree. The combination of the Master's degree, the extensive research experience and the hands-on experience obtained in the laboratory courses of the BS program would provide these students with excellent credentials to obtain a job in the biotech industry and/or to pursue a PhD.**

**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.)

**Master of Science in Biotechnology**

**Part I. Program History**

The Department of Biological Sciences has, for the last 20 years, offered the BS in Biotechnology to prepare students for careers in biotechnology. Although the program is relatively small (about 10 students/year), at least half of the students have historically been interested in pursuing an advanced degree. The program proposed here will permit students who are in this BS degree program to continue their studies at UD and obtain an MS in as little as one year after graduation.

**Part II. Admission**

Students applying into the MS degree program in Biotechnology must meet the following criteria:

1. They must be in good standing as students in the BS degree program in Biological Sciences with a concentration in Biotechnology at the University of Delaware. Applications from other students will not be considered.
2. They will have completed at least a year of undergraduate research with a faculty member in Biological Sciences by the time they receive their BS degree.
3. They must have taken or be enrolled in BISC602 and BISC654 for those interested in affiliating with the Molecular Biology and Genetics track or BISC605 and BISC612 for those interested in the Cell and Organ Systems Physiology track (see Curriculum below).
4. They must take the general GRE examinations. We have no minimum GRE score for admission although most admitted students have GREs over 1100 combined.

5. They must apply by January 15 of the year they plan to matriculate into the MS program. Earlier applications are encouraged. Admission decisions are usually made for this program by March 1.
6. One of the letters of recommendation must be from their undergraduate thesis mentor. For more information about the application process and other matters relating to graduate education in the Biological Sciences, see <http://www.udel.edu/bio/ed/grad/policy>.

Entrance into the MS degree program is dependent on the following additional requirements:

1. Students must satisfactorily complete all requirements for the BS degree in Biological Sciences with a concentration in Biotechnology.
2. Date of matriculation is June 1. A preliminary examination testing competence in Molecular Biology and Genetics or Cell and Organ Physiology will be given in June.
3. They must continue to work in the same laboratory where they performed their research as undergraduates.
4. The research mentor will support the student at least during the first summer. Students are expected to perform their research full time during the summer.

Expectations and requirements for obtaining a Master's degree:

1. Students must form their thesis committee and meet with them to formulate their thesis direction before September 1 following admission into the program.
2. They must pass the graduate preliminary examination of the track they are affiliated with. The possible grades are pass, conditional pass, retake and fail. All conditional passes must be fulfilled satisfactorily within six months into the program. Students receiving a retake grade must retake the exam (only one allowed) during the Fall semester of the same year and no later than December 15. The only possible outcomes of the retake are pass, conditional pass and fail. All conditions must be met within six months of the exam and no later than the defense of the MS thesis. Failure to pass the preliminary examination either the first or second time is likely to lead to a recommendation from the Department to the Graduate School that the student be terminated from the MS program.
3. Students must take at least 30 credit hours of course work, research and thesis as specified by the Molecular Biology and Genetics track or Cell and Organ Physiology track (see below under Curriculum).
4. To obtain the Master's degree, they must write and successfully defend a thesis based on their research.
5. Students can obtain their Master's degree as early as May 31 of the year after matriculation but must complete their Master's degree within three years of matriculation.

Applications to the MS program in Biotechnology and letters of recommendation are to be submitted to:

Office of Graduate Studies  
<http://www.udel.edu/gradoffice/applicants/> or via mail at

234 Hullahen Hall  
University of Delaware.  
Newark, Delaware 19716.

### **Part III. Academic**

The MS in Biotechnology requires certain courses as described below, the successful completion of the graduate preliminary examination and a public defense of a research based thesis.

## **Recommended Curriculum for students interested in Molecular Biology and Genetics**

### **Fall semester of Senior year of the BS degree**

- BISC 602 Molecular Biology of Animal Cells
- BISC 604 Nucleic Acids Laboratory
- Other requirements and electives as needed

### **Spring semester of Senior year**

- BISC 654 Biochemical Genetics
- BISC 619 Gene Expression Laboratory
- Other requirements and electives as needed

### **First Summer of Master's program**

- BISC 868 Research (6 credits)

### **Fall Semester of Master's program**

- BISC 868 Research (8 credits)
- BISC 665 Advanced Molecular Biology and Genetics (3 credits)
- BISC 827 Graduate Student Seminar (1 credit)

Total: 12 credits

### **Spring Semester of Master's program**

- BISC 869 Masters thesis (6 credits)
- BISC 868 Research (2 credits)
- BISC 6XX elective - must be one of the following (all these courses are also approved by the Molecular Biology and Genetics track)

BISC 605 Advanced Mammalian Physiology

BISC 612 Advanced Cell Biology

BISC 615 Vertebrate Developmental Biology

BISC 656 Evolutionary Genetics

BISC 671 Cellular and Molecular Immunology (4 credits)

BISC 679 Virology

BISC 693 Human Genetics

CHEM 645 Proteins: Structure and Function

CHEM 646 DNA-Protein Interactions

CHEM 648 Membrane Biochemistry

- BISC 827 Graduate Student Seminar (1 credit)

Total 12-13 credits

**Total required M.S. credits: 30**

## **Recommended curriculum for students interested in Cell and Organ Systems Physiology**

### **Fall semester of Senior year**

- BISC 605 Advanced Mammalian Physiology
- BISC 604 Nucleic Acids Laboratory
- Other requirements and electives as needed

### **Spring semester of Senior year**

- BISC 612 Advanced Cell Biology
- BISC 619 Gene Expression Laboratory
- Other requirements and electives as needed

### **First Summer of Master's program**

- BISC 868 Research (6 credits)

### **Fall semester of Master's program**

- BISC 868 Research 8 credits
- BISC 6XX Elective – must be one of the following courses (3 credits). All of these courses are also approved by the Cell and Organ Physiology Track.

BISC 602 Molecular Biology of Animal Cells

BISC 615 Vertebrate Developmental Biology

BISC 656 Evolutionary Genetics

BISC 665 Eukaryotic Molecular Biology and Genetics

BISC 671 Cellular and Molecular Immunology

BISC 679 Virology

- BISC 827 Graduate Student Seminar (1 credit)

Total: 12 credits

## Spring semester of Master's program

- BISC 869 Masters thesis (6 credits)
- BISC 868 Research (2 credits)
- BISC 806 Advances in Cell and Organ Systems (3 credits)
- BISC 827 (1 credit)

Total: 12 credits

**Total required MS credits: 30**

## Thesis Requirement

Students are encouraged to write and defend a thesis within one year but must do so within three years after matriculation into the M.S. degree program.

Students must maintain continuous enrollment in every regular semester (Fall and Spring) throughout their program except by approved leave of absence. This can be accomplished by registering for classes and thesis credit during the time the thesis project is underway, or by registering for sustaining status. See the catalog for the university policy on sustaining status at <http://www.udel.edu/gradoffice/current/policysustaining.html>, and regarding leave of absence at <http://udcatalog.udel.edu/general/grad/gradregs.html#leave>.

### Part IV. Financial aid

Students in the MS program in Biotechnology may compete for the same sources of financial assistance as is available to MS students in Biological Sciences. See <http://www.udel.edu/bio/ed/grad/policy/> for specifics. The same criteria for financial assistance apply.

### Other Financial Aid Opportunities

Other Fellowships and Internship opportunities are occasionally available through the University. Interested students should check the Office of Graduate Studies website at <http://www.udel.edu/gradoffice/applicants> for the most current opportunities.

### *Residence Hall Directorships*

In addition, the University hires Residence Hall Directors from among the ranks of its graduate students. Candidates are chosen for their superior leadership and communication skills, as well as the capability to provide guidance to undergraduates. Hall Directors are eligible for room and board, and full tuition waivers. Contact the Office of Housing and Residence Life at (302) 831-8423 for additional information as soon as possible. Applicants are usually interviewed around mid-April.

**Part V. Departmental Operations**

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.

**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 \_\_\_\_\_ Date \_\_\_\_\_

Vice Provost for Academic Programs & Planning \_\_\_\_\_ Date \_\_\_\_\_

Provost \_\_\_\_\_ Date \_\_\_\_\_

Board of Trustee Notification \_\_\_\_\_ Date \_\_\_\_\_

Revised 11/03/04 /khs

**Charles Mason**

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**From:** "Daniel Simmons" <dsimmons@UDel.Edu>  
**To:** "Charles Mason" <mason@UDel.Edu>  
**Cc:** "Melinda K. Duncan" <duncanm@UDel.Edu>; <marym@UDel.Edu>  
**Sent:** Thursday, February 07, 2008 11:38 AM  
**Attach:** Proposal- 02-08.doc; MS-biotech Academic Approval form 2-08.doc  
**Subject:** MS in biotechnology

Hi Chuck,

I have put together the proposal for the MS degree program in biotechnology in the appropriate format. Some of the questions that your committee brought up are answered within the proposal, but I include, below, answers to all your questions. I also attach the Academic Approval form but it should be the same as the one you already have.

Please let me know if you need anything else. Melinda Duncan and I will be at your meeting next Wednesday.

Thanks, Dan

1)

**Expected student matriculation:** Based on previous history of our BS degree students and expressed interest by current students, we expect between 1-3 students to matriculate into this program each year.

**Impact on other Departments:** Very little if any impact is expected. Because the proposed program requires students to first go through the BS program here at UD, students from other departments will not qualify and our BS students historically do not go into other graduate programs at UD.

**Relationship with other Departments:** We have ties with the Department of Animal Science in the College of Agriculture with respect to Biotechnology. Specifically, many of our BS students have taken ANSC644, Bioinformatics from that Department. We maintain an open dialogue about biotechnology. They are in the process of proposing a separate concentration in biotechnology that will be very different from ours and we strongly support their efforts.

**Employment:** The biotech program has an excellent history of seeing its graduates land jobs in industry and academia. We see this Master's program option as a mechanism to make our students even more marketable.

**Funding:** As explained in the proposal, funding is provided by the student's mentor. Therefore, an active grant is a prerequisite for a faculty member to sponsor a student in this program. Under some conditions, students may be assigned as TAs and their support during that time would come from the University.

**Faculty resources:** Since faculty external funding is needed, we assume that all qualified faculty have sufficient resources.

**Library assessment:** All of our graduate students have access to library resources (books, electronic journals, etc.). No new library support is needed.



Budgetary requirements: No additional costs would be incurred by the Department.

Evaluation plan: We propose to evaluate this program every two or three years to see if it is meeting our expected goals. Changes will be made as deemed appropriate.

Effect on MS degree program in Molecular Biology and Genetics: Most of the students we get in this MB and G program come from outside the University, so we expect little effect either way. The largest expected effect is actually that some of the students who are enrolled in this proposed MS program will find that they want to obtain a PhD and that some of these students will apply for admission into our PhD program.

2) Interdisciplinary programs: This proposed program will be small and will likely remain small. Also due to our requirement that students who matriculate into this MS program be former BS biotechnology students, it doesn't make much sense to make it interdisciplinary. We may, in the future, come up with a campus-wide interdisciplinary biotech program, but several attempts at this over the last few years have failed.

3) Graduate policy document: We will make sure that both of these documents are compatible.

Daniel Simmons  
Biological Sciences