

# 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 Concentration in Biotechnology for the M.S. in Biological Sciences

(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**  08J   
(use format 04F, 05W)

**Current degree**  MS   
(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 names:**  MS in Biological Sciences with a concentration 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:**  See attached   
(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:

None, this proposal seeks to codify our ongoing departmental policies at the level of the University.

### 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.)

Our department has required all of our graduate students to complete the curricular requirements of a "track" for many years although the track curricular requirements were never approved at the university level. At the request of the Office of Graduate Studies, we submitted our graduate program policy to through the appropriate channels for approval. In February of 2008, it was suggested by the University Graduate Studies Committee that we further revise our curriculum to change the term "Track" to "Concentration" so that the student's curriculum is noted on their transcript. This new proposal is in response to this request by the University graduate studies committee. At the same time, the University Graduate Studies Committee denied our request to initiate a MS in Biotechnology as an articulated program with our MS in Biological Sciences concentration in Biotechnology degree and suggested that this should be added as a new concentration leading to the MS in Biological Sciences.

**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.**

**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

# Concentration in “Biotechnology”

## Policy and Curriculum

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. The Concentration in Biotechnology will permit students who are enrolled in the BS in Biological Sciences, concentration in Biotechnology degree program to continue their studies at UD and obtain an MS in Biological Sciences in as little as one year after graduation. All students interested in pursuing this concentration must contact the Graduate Program Director of the Department of Biological Sciences prior to the start of Fall of their Senior year to ensure that they are registered for the appropriate course work during the last year in the BS program. Students admitted in the MS degree in Biological Sciences, Concentration in Biotechnology must:

1. 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 interested in Molecular Biology and Genetics or BISC605 and BISC612 for those interested in the Cell and Organ Systems Physiology (see Curriculum below) and have earned a grade of B or better in these courses consistent with Departmental Graduate Program Policy during their senior year as BS Biological Sciences, Concentration in Biotechnology students. According to graduate program policy, failure to earn a B or better in these required courses during the senior year makes the student ineligible to take the preliminary examination in June after their senior year and thus they are ineligible to pursue the concentration in Biotechnology.
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 in Biological Sciences, Biotechnology Concentration 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. Students must have earned a grade of B or better in the two required graduate courses

they have taken during the senior year (either BISC602 and BISC654 or BISC 605 and BISC612)

3. Date of matriculation is June 1. A preliminary examination testing competence in Molecular Biology and Genetics or Cell and Organ Systems Physiology will be given in June.
4. They must continue to work in the same laboratory where they performed their research as undergraduates.
5. 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 after completion of the preliminary examination.

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 either the Molecular Biology and Genetics Concentration or Cell and Organ Systems Concentration. 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 either the concentration in Molecular Biology and Genetics or the concentration in Cell and Organ Systems (see below under Curriculum).
4. Students are expected to engage in full time research towards the thesis both during the first summer in the graduate program after completing the preliminary examination and Winter term of the first year.
5. To obtain the Master's degree, they must write and successfully defend a thesis based on their research.
6. 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.

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.

## **Concentration in Biotechnology 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 (Core)
- BISC 604 Nucleic Acids Laboratory
- Other requirements and electives as needed

## **Spring semester of Senior year**

- BISC 654 Biochemical Genetics (Core)
- 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 (Core) (3 credits)
- BISC 827 Graduate Student Seminar (Core) (1 credit)

Total: 12 credits

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

- BISC 869 Masters thesis (6 credits)
- BISC 868 Research (2 credits)
- BISC 827 Graduate Student Seminar (Core) (1 credit)
- BISC 6XX elective (Core) –(3 Credits) must be one of the following (all these courses are also approved for the Molecular Biology and Genetics Concentration)

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

Total 12 credits

**Total required M.S. 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.

## Concentration in Biotechnology Curriculum for students interested in Cell and Organ Systems

### Fall semester of Senior year

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

### Spring semester of Senior year

- BISC 612 Advanced Cell Biology (Core)
- 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 827 Graduate Student Seminar (core) (1 credit)
- BISC 6XX Elective (core) – must be one of the following courses (3 credits).

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

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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 (core) (3 credits)
- BISC 827 (core) (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.

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