

Biotechnology

University of Wisconsin-River Falls
www.uwrf.edu/biotech

The rapid advances made in biochemistry and molecular biology have led to the development of a new industry which uses modified, living organisms to produce its products. This industry, generally referred to as biotechnology, is based upon genetic engineering and related techniques. As the applications of biotechnology expand and increase, so too will the number and scope of the job opportunities available.

Goals and Objectives The biotechnology program mission is to provide students with a solid foundation in the rapidly expanding field of biotechnology. The major is interdisciplinary and laboratory intensive. Our goal is to provide students with a knowledge and understanding of current theories, concepts and laboratory practices in biotechnology and an appreciation for the virtues of an open-minded approach to controversial issues.

Program and/or Curriculum The bachelor of science degree in biotechnology can be completed in either the College of Arts and Sciences or the College of Agriculture, Food and Environmental Sciences. The major requirements and university general education requirements for the two degrees are identical. The degrees differ only in the college requirements.

Faculty Biotechnology is an interdepartmental major offered jointly by the departments of biology, chemistry, plant and earth science, and animal and food science. The participating departments employ more than fifty faculty who have doctoral degrees. Eleven of these faculty members are directly involved in the biotechnology program. Their specialties include: retroviruses, animal cell culture, micropropagation of plants, human genetics, biosensors, immunology, enzymology, protein purification and characterization, virus-induced tumors, plant tissue culture, bacterial metabolism and fermentation, plant molecular biology and the expression of mammalian genes. The departments that offer the biotechnology major are housed in modern facilities with well-equipped laboratories that include state-of-the-art equipment for laboratory teaching and research.

Career Opportunities Program graduates enjoy an excellent placement rate in industry and in graduate and professional schools. Persons with a degree in biotechnology pursue careers in one of the following areas:

Medical Biotechnology: The diagnosis, treatment and prevention of disease have all benefited from the use of biotechnology. Diagnoses of both infectious diseases and genetic disorders have been improved by assays using biotechnology. The development and production of preventative agents, such as vaccines, and medications by animals and microorganisms have been expanded to include antibiotics, anti-toxins and other medicines. New methods of treating diseases are also being explored, such as injecting active genes into individuals to replace the inherited inactive genes which cause inherited disorders.

Plant Biotechnology: Biotechnology is being used to increase crop yields by inserting genes for resistance to diseases or pests using genetic engineering techniques. Crops such as soybean and canola are being modified to increase their usefulness as industrial lubricants and to produce oils lower in saturated fat that will have a longer shelf life.

Environmental Protection and Cleanup: Genetically engineered plants and microorganisms are being used to remove toxins from the environment in a process known as bioremediation. In a process called biopulping, a fungus is used to speed the conversion of wood chips into paper pulp. The goal is to reduce both energy use and the production of water-polluting byproducts.

Industrial Biotechnology: Microorganisms are a source of biological catalysts called enzymes that are used in the food industry to produce a variety of products including amino acids which serve as sweeteners or as food additives and animal feed supplements.

Animal Biotechnology: Animals have been modified to produce drugs that can be recovered from their milk. Dairy scientists are also developing methods to produce many calves from one embryo. Students completing a bachelor's degree in biotechnology are well prepared for careers as research scientists in industry, government agencies, foundations, hospitals and clinics. They will also be prepared to pursue advanced degrees in master's and doctoral programs in the variety of specialized disciplines of biology, chemistry, medicine, animal science, food science and plant science.



BIOTECHNOLOGY

Biotechnology Program
404 Agriculture Science Hall
(715) 425-3364



Bachelor of Science Degree. Academic Advising Plan.

Semester 1 (Fall)

BIOL 150	Introduction to Biology	3
CHEM 121	General Chemistry I and Lab	5
MATH 166	Calculus I	4
General education CW (ENGL 100)		3
General education HW		1
Total semester credits		16

Semester 2 (Spring)

BIOL 210	General Botany	
or BIOL 230	General Zoology	3
CHEM 122	General Chemistry II and Lab	5
General education CS		3
General education HW		1
General education SB		3
Total semester credits		15

Semester 3 (Fall)

BIOL 240	Cell and Molecular Biology	3
CHEM 231	Organic Chemistry I and	
CHEM 236	Organic Chemistry I Lab	4
CHEM 251	Analytical Chemistry	2
PHYS 151	General Physics I and	
PHYS 156	General Physics I Lab	5
General Education CA (Engl 200)		3
Total semester credits		17

Semester 4 (Spring)

BIOL 324	Microbiology	4
CHEM 232	Organic Chemistry II and	
CHEM 237	Organic Chemistry II Lab	4
CHEM 256	Analytical Chemistry Lab	1
PHYS 152	General Physics II and	
PHYS 157	General Physics II Lab	5
General education HF		3
Total semester credits		17

Semester 5 (Fall)

Biology 453	Virology or	
Biology 345	Immunology	3
CHEM 361	Biochemistry I	3
CHEM 355	Separations Lab	1
General education HF		3
General Education EC		3
College required course		3
Total semester credits		16

Semester 6 (Spring)

BIOL 350	Genetics and Evolution	3
CHEM 362	Biochemistry II and	
CHEM 366	Biochemistry II Lab	4
Biotechnology elective course		3
General education SB/Global perspective		3
College required course		3
Total semester credits		16

Semester 7 (Fall)

BIOL 451	Molecular Biology	4
FDSC 335	Food Microbiology	4
Biotechnology elective		3
College required course		4
Total semester credits		15

Semester 8 (Spring)

BIOL 463	Animal Cell Culture or	
HORT 369	Plant Tissue Culture	3
FDSC 460	Fermentation Technology	3
BIOT 480	Biotechnology Seminar	1
Biotechnology elective		2
General education MD		3
American cultural diversity		3
Total semester credits		15

Summary of Degree Requirements

General Education and University Requirements	*29-31 or 35-37 cr.
College Requirements	8-10 cr.
Biotechnology Core	**40-41 cr.
Biotechnology Electives	6 cr.
Specialization Area	9 cr.
Required Supporting Courses	**23-25 cr.
Credits to Degree	120-128 cr.

*American Cultural Diversity and Global Perspectives Courses can double count elsewhere in the curriculum (such as for Liberal Arts/college requirements).

**Does not include courses that meet the General Education Requirement.

September 2008

College of Arts and Sciences:

Liberal Arts 3 courses: minimum of 8 credits. Courses must be at the 200 level or above with the exception of Modern Language courses; testout credits are excluded. Students must take courses from at least 2 divisions. (The divisions are: Humanities/Fine Arts; Modern Language; Sciences/Mathematics; Social Sciences.) Students may take 1 course in division of either major or minor, but course cannot be in either the major or minor designator area. (e.g., a Psychology major/Sociology minor could take a History course for Liberal Arts, but could not take either a PSYC or SOCI designated course to fulfill this requirement).

College of Agriculture, Food and Environmental Sciences:

ANSC 111, Introduction to Animal Science 3 cr.; FDSC 112,113 Introduction to Food Science and Lab 4 cr.; HORT 161 Introduction to Horticulture 3 cr.