

Biotechnology

University of Wisconsin-River Falls
www.uwrf.edu

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
225 Centennial Science Hall
(715) 425-3577



Bachelor of Science Degree. Academic Advising Plan.

Semester 1 (Fall)

BIOL 150	Introduction to Biology	3
CHEM 121	General Chemistry I and Lab	5
ENGL 111	Freshman English.....	3
MATH 166	Calculus I.....	4
	Physical Education Activity Course5
	Total semester credits.....	15.5

Semester 2 (Spring)

CHEM 122	General Chemistry II and Lab.....	5
ENGL 112	Freshman English.....	3
P ED 108	Health and Fitness for Life	1
	General Education Fine Arts Course	3
	General Education Social Science Course	3
	Total semester credits	15

Semester 3 (Fall)

BIOL 210	General Botany	
or BIOL 230	General Zoology	3
CHEM 231,236	Organic Chemistry I and Lab.....	4
PHYS 151,156	General Physics I and Lab	5
SCTA 101	Fundamentals of Oral Comm.....	3
	Total semester credits	15

Semester 4 (Spring)

BIOL 240	Cell and Molecular Biology	3
CHEM 232,237	Organic Chemistry II and Lab	4
ENGL 241-245	Sophomore Literature Course.....	3
PHYS 152,157	General Physics II and Lab	5
	Physical Education Activity Course5
	Total semester credits	15.5

Semester 5 (Fall)

CHEM 361	Biochemistry I.....	3
CHEM 251,256	Analytical Chemistry and Lab	3
BIOL 324	Microbiology.....	4
	General Education Social Science Course	3
	Diversity Course	3
	Total semester credits	16

Semester 6 (Spring)

BIOL 350	Genetics and Evolution	3
CHEM 362,366	Biochemistry II and Lab	4
BIOL 463	Animal Cell Culture	
or HORT 369	Plant Tissue Culture.....	3
	Biotechnology Elective Course	3
	College required course	3
	Total semester credits	16

Semester 7 (Fall)

BIOL 451	Molecular Biology	4
BIOL 453	Virology	3
CHEM 355	Separation Lab.....	1
FDSC 335	Food Microbiology	4
	College required course	4
	Total semester credits.....	16

Semester 8 (Spring)

BIOT 480	Biotechnology Seminar.....	1
FDSC 460	Fermentation Technology	3
IHUM 498	Humanities.....	2
ISCI 496	Social Science	2
	Biotechnology Elective Courses (two).....	5
	College required course	3
	Total semester credits.....	16

College of Arts and Sciences: Students must complete 10 credits of coursework selected from the divisions of humanities/fine arts, modern language, and/or social sciences. All courses must be at the 200 level or above with the exception of modern language courses (excluding testout credits). At least 3 credits of coursework must be completed in each of two divisions, but no more than 6 credits in any one division. The diversity requirement can be met by a course which also meets one of the division requirements.

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.

Summary of Degree Requirements

General Education	39-43 cr.
College Requirements	10 cr.
Biotechnology Core	*57 cr.
Directed Electives.....	8 cr.
Required Supporting Courses.....	*8 cr.
Credits to Degree	122-126 cr.

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