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**MINNESOTA STATE
UNIVERSITY**
MANKATO

BIOTECHNOLOGY *College of Science, Engineering & Technology*

WHAT DEGREES AND PROGRAMS DO WE OFFER?

The Department of Biological Sciences offers the Bachelor of Science in Biotechnology degree, one of only a few such programs in the United States. The purpose of this major is to provide the background theory and applied laboratory techniques necessary for baccalaureate level biotechnology professionals to successfully enter the growing biotechnology job market. There is an ever-increasing need for personnel familiar with the engineering aspects as well as the biology, biochemistry and genetic aspects of this rapidly developing technology.

CAREER OPPORTUNITIES AVAILABLE FOR STUDENTS COMPLETING THIS PROGRAM

Biotechnology is projected as being the next generation of industrial growth. Predictions indicate that biotechnology will be one of the most rapidly expanding applied sciences during the first part of the 21st century. The advanced applications of gene cloning and other important techniques will revolutionize agriculture and medicine as well as industrial production of chemical and other commercially important products.

Biotechnology will provide you with many exciting and challenging opportunities in science. This developing industry will require a well-trained workforce with much room for professional growth. Opportunities for biotechnologists exist at all educational levels. Researchers at many companies and universities are working to apply fundamental advances in microbiology, immunology, molecular biology, and plant biology to solve a variety of industrial and environmental problems. Bacteria, plant, and animal cell cultures are used as factories to produce organic chemicals, enzymes, and monoclonal antibodies. Many of these products may be familiar to you, such as ethanol for use in gasohol. However, there are many products and processes that are just now being developed. Some recent examples are the use of bacteria in the mining and recovery of low-grade ores and the application of plant cultures to improve and develop more productive and hardy varieties of plants.

Beginning salaries for graduates range from \$30,000 to \$40,000.

OPPORTUNITIES

Academic

Approximately 25 percent of the biotechnology majors go on for advanced degrees. They have been nearly 100 percent successful in

being accepted to graduate school. Examples of universities attended include the University of Minnesota, Washington State University, Rice University, and the University of Illinois-Champaign-Urbana.

Jobs

Entry-level biotechnology jobs are often associated with quality assurance/quality control labs, either in industrial or governmental settings. A significant number of opportunities also exist in production facilities. Salary range is from \$27,000 to \$35,000. Placement varies geographically: large urban areas have many opportunities and placement is high. Rural areas have fewer opportunities and the range of needs is more limited. Still, many students choose to remain in the rural areas and find biotechnology-related jobs.

PROGRAM QUALITY INDICATORS

Faculty credentials

We have 22 faculty, all holding their terminal degrees. We have no courses taught by teaching assistants. Teaching assistants are common in the laboratory components of our first and second year courses. Third and fourth year courses are all taught by faculty.

STUDENT EXPERIENCE/PROGRAM REQUIREMENTS

Faculty/Student Ratio

1:22

Scholarships

There are approximately 15 scholarships available for upper level students through the Department of Biological Sciences and the College of Science, Engineering, and Technology.

Internships

An internship is recommended but not required. Many opportunities, some involving stipends, are available for this type of training experience.

Specialized equipment/facilities available

Teaching and research facilities are housed in Trafton Science Center, a modern building with modern, sophisticated equipment. The special arrangement of classroom laboratories and research laboratories provides the student with excellent opportunities to gain valuable experience working with instructors on special research projects.

Clubs and organizations

Our most active student organizations are Biology Club, Wildlife Club, and Pre-Med Club. There is no specific Biotechnology club.

BACKGROUND PREPARATION

A student intending to major in biotechnology needs a strong, balanced college preparatory program with courses in mathematics and the sciences, particularly biology and chemistry.

FOR MORE INFORMATION PLEASE CONTACT

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You are encouraged to visit the campus.

To arrange for a visit, please call:

Office of Admissions: 507-389-1822

Toll-Free: 800-722-0544

SAMPLE FOUR-YEAR CURRICULUM (BIOTECHNOLOGY, BS)

First Year (Fall)	First Year (Spring)
BIOL 105 General Biology I (4) MATH 121 Calculus I (4) ENG 101 Composition (4) General Education Course (3)	BIOL 106 General Biology II (4) MATH 122 Calculus II OR HLTH 475 Biostatistics (3) OR STAT 154 Elementary Statistics (3) General Education, Writing Intensive (4) General Education Course (3-4)
Second Year (Fall)	Second Year (Spring)
BIOL 211 Genetics (4) CHEM 201 General Chemistry I (5) PHYS 211 Principles of Physics I (4) General Education Course (2)	BIOL 270 General Microbiology (4) CHEM 202 General Chemistry (5) PHYS 212 Principles of Physics II (4) General Education Course (2)
Third Year (Fall)	Third Year (Spring)
BIOL 320 Cell Biology (4) CHEM 322 Organic Chemistry I (4) CHEM 323 Supplemental Organic Functional Group Chemistry (1) General Education, Writing Intensive (3) General Education Course (3)	BIOL 452 Biological Instruments (3) BIOL 479 Molecular Biology (4) CHEM 360 Principles of Biochemistry (4) General Education Course (4)
Fourth Year (Fall)	Fourth Year (Spring)
BIOL 453 Biological Engineering Analysis I (4) BIOL 474 Immunology (4) BIOL 456 Biotechnology Project/Lab I (3) OR BIOL 497 Internship I (3) OR BIOL 499 Individual Study (3) General Education, Purple or Gold (4)	BIOL 454 Biological Engineering Analysis II (4) BIOL 476 Microbial Physiology and Genetics (5) BIOL 457 Biotechnology Project/Lab II (3) OR BIOL 497 Internship I (3) OR BIOL 499 Individual Study (3) General Education, Purple (3)

For additional information about course requirements, please visit <http://www.mnsu.edu/supersite/academics/bulletins/>

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