

Microbiology

Department Information

- **Department Web Site:**
www.ndsu.edu/microbiology/ (<http://www.ndsu.edu/microbiology/>)
- **Credential Offered:**
B.S.; Minor
- **Official Program Curriculum:**
catalog.ndsu.edu/undergraduate/program-curriculum/microbiology/ (<http://catalog.ndsu.edu/undergraduate/program-curriculum/microbiology/>)

Microbiology is a fundamental biological science concerned with bacteria, viruses, and other microbes. Microbiologists have made some of the most important scientific discoveries. Since 1910, approximately one-third of the Nobel Prizes in medicine and physiology have been awarded to microbiologists. The discipline covers a wide spectrum of specialized interest areas that show how microbes affect human and animal health, agriculture, our environment, food technology and safety, and the biotechnology industry. Microbiology prepares students for a wide range of important career opportunities.

In recent years, microbiology has had a major impact on virtually all other scientific disciplines. For this reason, students who choose to major in microbiology often minor in biotechnology, chemistry, or food safety. Students who choose to major in other fields may find it advantageous to minor in microbiology.

CAREER OPPORTUNITIES

Graduates may seek employment in the health sciences, biomedical industries, biotechnology, agricultural biosystems, food industries, pharmaceutical industries, and government agencies. Our graduates work in public health, hospital laboratories, quality control laboratories to ensure a safe food supply, academic, government, or private research laboratories, biotechnology production laboratories, and even breweries. Many microbiologists are teachers and professors, and many of our graduates attend graduate or professional school to continue their career development. Microbiologists work in government agencies such as state public health units, the National Institutes of Health (NIH), the Centers for Disease Control (CDC), the United States Department of Agriculture (USDA), and the Environmental Protection Agency (EPA).

Scholarship Opportunities

Students who major in microbiology can apply for part of ~\$12,000 in scholarships that are dedicated funds for our major and ~\$7500 in scholarships for Microbiology Majors planning to apply for veterinary school. Visit the website (<https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/microbiology-scholarships/>) for microbiology specific scholarships.

High School Preparation

Courses in science and mathematics, such as algebra, biology, physics, and chemistry, will help students prepare for a major in microbiology.

Transfer student PREPARATION

Transfer students are strongly advised to take transferable intro biology and chemistry courses in preparation for upper-level science courses at NDSU.

The Curriculum

During the first year, students in microbiology take basic college courses in English, chemistry, biology, and mathematics. The curriculum over the next three years includes advanced microbiology and life sciences courses. These courses include microbial physiology, microbial genetics, virology, immunology, and microbial ecology. Students majoring in microbiology can enhance their understanding of applied microbiology and infectious disease by taking courses such as pathogenic microbiology, clinical parasitology, food microbiology, and microbial genomics. Students may choose to minor in programs such as biotechnology, public health, and food safety.

Program Outcomes

1. Demonstrate a familiarity with professional and ethical behavior in microbiology.
2. Identify and explain microbiology discipline-specific knowledge and concepts.
3. Describe the process of scholarly inquiry in microbiology
4. Perform classical and modern microbiological techniques with consistency.
5. Communicate scientific results and scientific understanding to a chosen audience.
6. Participates effectively as a team member in collaborative work.

7. Exhibit professional skills and personal effectiveness to enter the job market.
8. Describe their role and begin participating in being civically responsible, contributing citizens, and creating inclusive environments.

Pathways to Success

The department of Microbiological Sciences offers several "Pathways to Success." Depending on your career goals, you may find that one of these pathways will enhance your education to meet those goals. We currently have Pathways to Success in General Microbiology, Pre-Health Careers, Pre-Veterinary careers, Biotechnology (Double Major), and Accelerated Master's (Public Health or Microbiology).

STUDENT ORGANIZATIONS

We have an active Biotechnology and Microbiology Club that tours local businesses related to biotechnology and microbiology, hosts guest speakers currently working in the fields of microbiology and biotechnology, and meets for social events throughout the year.

The Faculty

The teaching faculty offers expertise and experience in a variety of microbiology areas. Additionally, faculty members are active researchers and devoted research mentors. Our undergraduates have opportunities to perform cutting-edge research in nationally funded laboratories.

The FACILITIES

The Department of Microbiological Sciences in Van Es Hall has well-equipped teaching and research laboratories, including our Biotechnology Innovation Core. Several courses are taught in the dedicated STEM education building, A. Glenn Hill Center.

Post Graduate Opportunities

Professional School Preparation. The microbiology major is excellent preparation for professional school, including medical, veterinary, dental, optometry, and physician assistant programs.

Graduate School. The microbiology major emphasizes experiential learning in coursework and research laboratories that provide the foundation to be successful in graduate school. We even offer an accelerated master's program to help students optimize their timeline to completing their graduate degree while finishing their bachelor's degree.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years. Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree completion, enrolled students should utilize Degree Map (<https://www.ndsu.edu/registrar/degreemap/>) and Schedule Planner (<https://www.ndsu.edu/onestop/degree-map-and-planning/>) in Campus Connection and consult regularly with academic advisors to ensure graduation requirements are being met.

First Year			
Fall	Credits	Spring	Credits
MICR 189*		1 BIOL 151	3
CHEM 121		3 BIOL 151L	1
CHEM 121L		1 CHEM 122	3
BIOL 150		3 CHEM 122L	1
BIOL 150L		1 ENGL 120	3
ENGL 110		3 Gen Ed Social and Behavioral/ Global Perspectives	3
MATH 105 or 146 ²		3 Gen Ed Wellness	2
15			16
Second Year			
Fall	Credits	Spring	Credits
COMM 110		3 MICR 352	3
CHEM 341		3 MICR 352L	2
CHEM 341L		1 PLSC 315	3
STAT 330		3 PLSC 315L	1
MICR 350		3 CHEM 342	3

MICR 350L	2	MICR 452	3
15		15	
Third Year			
Fall	Credits	Spring	Credits
BIOC 460		3 BIOC 461	3
PHYS 211		3 PHYS 212	3
PHYS 211L		1 PHYS 212L	1
MICR 470		3 MICR 480	3
PHIL Course Requirements ¹		3 Microbiology Elective	3
Gen Ed Humanities and Fine Arts/ Cultural Diversity		3 MICR 485	1
16		14	
Fourth Year			
Fall	Credits	Spring	Credits
Upper Division Writing Gen Ed		3 Microbiology Elective Laboratory ³	2
MICR 482		3 Microbiology Elective	3
MICR 475		3 MICR 486	1
Microbiology Capstone Elective ⁴		2 Microbiology Elective	3
Gen Ed Social & Behavioral Sciences		3 Free Elective	6
14		15	

Total Credits: 120

*

Only required for first-time, first-year students.

1

Select from PHIL 111, PHIL 210, PHIL 215, PHIL 216, PHIL 225 or PHIL 327

2

Or higher level math

3

BIOC 474 or MICR 445 or MICR 460L or MICR 471

4

MICR 493 or MICR 494 or MICR 496 or MICR 497 (must be a minimum of 2 credits)