

# Microbiology Major

## Major Requirements

Degree Type: B.S.  
Minimum Credits Required: 120

### University Degree Requirements

For complete details on these and other university degree requirements, refer to the Degree and Graduation Requirements (<http://catalog.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/>) section in the University Catalog.

1. Minimum of 120 semester credits (some programs may exceed this minimum).
2. Complete the University General Education requirements.
3. Minimum institutional GPA of 2.00 based on work taken at NDSU.
4. Minimum of 30 credits in resident at NDSU.
5. Minimum of 36 upper level credits (courses numbered 300 or higher).
6. Students with transfer credit must meet the NDSU 30 credits in residence (#4). Of these 30 credits in residence, a minimum of 15 credits must be in courses numbered 300 or above, and 15 credits must be in the student's declared major curricula.

### University General Education Requirements

A list of university approved general education courses along with the administrative policies governing the requirement and the categories is available here (<http://catalog.ndsu.edu/academic-policies/undergraduate-policies/general-education/>).

| Code                                       | Title | Credits |
|--|-------|---------|
| Category C: Communication                  |       | 12      |
| Category R: Quantitative Reasoning         |       | 3       |
| Category S: Science and Technology         |       | 10      |
| Category A: Humanities and Fine Arts       |       | 6       |
| Category B: Social and Behavioral Sciences |       | 6       |
| Category W: Wellness                       |       | 2       |
| Category D: Cultural Diversity             |       |         |
| Category G: Global Perspectives            |       |         |
| Category L: Digital Literacy               |       |         |
| Total Credits                              |       | 39      |

### Major Requirements

| Code   | Title   | Credits |
|--|---|---------|
| MICR 189   | Skills for Academic Success <sup>1,2</sup>                        | 1       |
| MICR 350 & 350L  | General Microbiology and General Microbiology Lab <sup>2</sup>    | 5       |
| MICR 352   | The Science Toolkit: Skills for Scientific Success <sup>2</sup>   | 3       |
| MICR 452   | Microbial Ecology <sup>2,3</sup>                                  | 3       |
| MICR 470   | Basic Immunology <sup>2,3</sup>                                   | 3       |
| MICR 475   | Virology <sup>2,3</sup>   | 3       |
| MICR 480   | Microbial Physiology <sup>2,3</sup>                               | 3       |
| MICR 482   | Microbial Genetics <sup>2,3</sup>                                 | 3       |
| MICR 485   | Capstone Experience I: Reflecting and Planning <sup>2</sup>       | 1       |
| MICR 486   | Capstone Experience II: Reflection and Dissemination <sup>2</sup> | 1       |
| Required Capstone Experience - Select one course experience of the following: <sup>2</sup> |   | 2       |
| MICR 493   | Undergraduate Research  |         |
| MICR 494   | Individual Study  |         |
| MICR 497   | FE/Coop Ed/Internship   |         |
| BIOC 460   | Foundations of Biochemistry and Molecular Biology I               | 3       |
| BIOC 461   | Foundations of Biochemistry and Molecular Biology II              | 3       |

|  |  |              |
|--|--|--------------|
| BIOL 150<br>& 150L   | General Biology I<br>and General Biology I Laboratory        | 4            |
| BIOL 151<br>& 151L   | General Biology II<br>and General Biology II Laboratory      | 4            |
| CHEM 121<br>& 121L   | General Chemistry I<br>and General Chemistry I Laboratory    | 4            |
| CHEM 122<br>& 122L   | General Chemistry II<br>and General Chemistry II Laboratory  | 4            |
| CHEM 341<br>& 341L   | Organic Chemistry I<br>and Organic Chemistry I Laboratory    | 4            |
| CHEM 342   | Organic Chemistry II   | 3            |
| ENGL 324<br>or ENGL 325  | Writing in the Sciences<br>Writing in the Health Professions | 3            |
| PHYS 211<br>& 211L   | College Physics I<br>and College Physics I Laboratory        | 4            |
| PHYS 212<br>& 212L   | College Physics II<br>and College Physics II Laboratory      | 4            |
| PLSC 315<br>& 315L   | Genetics<br>and Genetics Laboratory                          | 4            |
| STAT 330   | Introductory Statistics                                      | 3            |
| Select one philosophy course from the following:   |  | 3            |
| PHIL 111   | Professional Responsibility and Ethics                       |              |
| PHIL 210   | Ethics   |              |
| PHIL 215   | Contemporary Moral Issues                                    |              |
| PHIL 216   | Business Ethics  |              |
| PHIL 225   | Environmental Ethics   |              |
| PHIL 327   | Ethics, Engineering, and Technology                          |              |
| Select one math course from the following:   |  | 3-4          |
| MATH 105   | Trigonometry   |              |
| MATH 107   | Precalculus  |              |
| MATH 146   | Applied Calculus I   |              |
| MATH 165   | Calculus I   |              |
| <b>Subplan</b>   |  |              |
| Select either the Standard Microbiology subplan or the Biomedical Sciences subplan to complete the major requirements. |  | 15           |
| <b>Total Credits</b>   |  | <b>96-97</b> |

## Standard MICROBIOLOGY Subplan

| Code   | Title   | Credits |
|--|---|---------|
| Select a minimum of 12 credits from the following course list. |   | 12      |
| MICR 379<br>or MICR 492  | Global Seminar (with prior approval) <sup>2</sup><br>Global Practicum: Study Abroad |         |
| MICR 394   | Individual Study (no more than 3 credits) <sup>2</sup>                              |         |
| MICR 453   | Food Microbiology <sup>2,3</sup>  |         |
| MICR 454   | Biotechnology for Sustainability <sup>2,3</sup>                                     |         |
| MICR 455   | Microbial Biotechnology <sup>2,3</sup>  |         |
| MICR 456   | Human Microbiome <sup>2,3</sup>   |         |
| MICR 457   | Microbiomes: Agriculture and Environmental Resilience <sup>2,3</sup>                |         |
| MICR 458   | Animal Health and Antimicrobial Resistance (AMR) <sup>2,3</sup>                     |         |
| MICR 460   | Microbial Pathogenesis <sup>2,3</sup>   |         |
| MICR 481   | Microbial Genomics with Computational Laboratory <sup>2,3</sup>                     |         |
| MICR 491   | Seminar ((1-3 credits)) <sup>2</sup>  |         |
| ANSC 475   | One Health <sup>2,3</sup>   |         |
| BIOC 483   | Cellular Signal Transduction Processes and Metabolic Regulations <sup>2,3</sup>     |         |

|   |   |
|---|---|
| BIOC 487  | Molecular Biology of Gene Expression <sup>2,3</sup>   |
| BIOL 401  | Science Communication <sup>2,3</sup>                  |
| PLSC 307  | History and Evolution of Wine in America <sup>2</sup> |
| PLSC 431  | Intermediate Genetics <sup>2,3</sup>                  |
| PPTH 424  | Fundamental Plant Pathology                           |
| PPTH 435  | Principles of Plant Disease Management                |
| PPTH 437  | Practices of Plant Disease Management Research        |
| PPTH 447  | Fundamentals of Molecular Techniques in Agriculture   |
| PPTH 460  | Fungal Biology <sup>2,3</sup>                         |
| SOIL 351  | Soil Ecology <sup>2</sup>                             |
| Laboratory Courses - Select at least 3 credits from the following: <sup>2</sup> |   |
| MICR 445  | Animal Cell Culture Techniques <sup>2,3</sup>         |
| MICR 453L   | Food Microbiology Laboratory <sup>2,3</sup>           |
| MICR 460L   | Microbial Pathogenesis Laboratory <sup>2,3</sup>      |
| MICR 471  | Immunology and Serology Laboratory <sup>2,3</sup>     |
| BIOC 474  | Methods of Recombinant DNA Technology <sup>2,3</sup>  |
| PPTH 424L   | Fundamental Plant Pathology Laboratory                |
| PPTH 448  | Plant Disease Diagnostics and Quantification          |

**Total Credits** 15

### Biomedical Sciences subplan

| Code  | Title   | Credits |
|---|---|---------|
| MICR 460  | Microbial Pathogenesis <sup>2,3</sup>                         | 3       |
| MICR 460L   | Microbial Pathogenesis Laboratory <sup>2,3</sup>              | 2       |
| Select a minimum of 10 credits from the following: <sup>2</sup> |   | 10      |
| ANSC 218  | Anatomy and Physiology of Domestic Animals                    |         |
| ANSC 219  | Anatomy and Physiology Laboratory                             |         |
| ANSC 300  | Domestic Animal Behavior and Management                       |         |
| ANSC 370  | Fundamentals/Animal Disease                                   |         |
| ANSC 371  | Fundamentals of Animal Disease II                             |         |
| BIOL 220  | Human Anatomy and Physiology I                                |         |
| BIOL 220L   | Human Anatomy and Physiology I Laboratory                     |         |
| BIOL 221  | Human Anatomy and Physiology II                               |         |
| BIOL 221L   | Human Anatomy and Physiology II Laboratory                    |         |
| BIOL 370  | Cell Biology  |         |
| BIOL 401  | Science Communication <sup>3</sup>                            |         |
| BIOL 483  | Cellular Mechanisms of Diseases <sup>3</sup>                  |         |
| MLS 435   | Hematology  |         |
| MICR 456  | Human Microbiome <sup>3</sup>                                 |         |
| MICR 458  | Animal Health and Antimicrobial Resistance (AMR) <sup>3</sup> |         |
| MICR 477  | Vaccinology <sup>3</sup>                                      |         |
| PH 474  | Epidemiology  |         |

**Total Credits** 15

<sup>1</sup> MICR189 is required for new students to our programs - This includes: first-time, first-year student and transfer students into the university.

Students who change their major are not required to take MICR 189, but can elect to.

<sup>2</sup> Requires a grade of C or better.

<sup>3</sup> Courses offered at the 600 level can be used in the B.S./M.S. accelerated program. The 600 level courses have additional outcomes/requirements for graduate level students. When students complete and submit the Accelerated Declaration form, the courses must be identified and no more than 15 credits of graduate coursework can be counted toward the B.S. degree.

## Accelerated Undergraduate to Master's Degree Programs

- Students may participate in an accelerated program in the following areas:
  - B.S. Microbiology to Master of Science in Microbiology
  - B.S. Microbiology to Master of Public Health
- A 3.0 GPA is required for the B.S./M.S. accelerated programs
- Instructions to apply are found here (<https://www.ndsu.edu/onestop/accelerated-degrees-undergraduate-graduate-programs/>).
- A sample 5-year plan for interested students can be found on the department website (<https://www.ndsu.edu/agriculture/academics/academic-units/microbiological-sciences/undergraduate-programs/pathways-success/>).
- Students may complete a thesis-based or comprehensive study-based masters program. Outcomes of these master's programs can be found here (<https://catalog.ndsu.edu/programs-study/graduate/microbiology/#degreerequirementstext>).