

Microbiology, BS

Microbiology is an excellent major for undergraduate students who want a strong general education with an emphasis on an important and interesting branch of biological sciences.

Majoring in microbiology offers many benefits, including the following.

- **Diverse career opportunities:** Microbiology opens doors to various fields such as healthcare, environmental science, biotechnology, and research.
- **Medical advancements:** Microbiologists play a crucial role in developing new treatments and diagnostic tools, contributing to public health.
- **Environmental impact:** Studying microbiology helps in understanding and solving environmental issues, such as pollution and climate change.
- **Biotechnology innovations:** Microbiologists are at the forefront of creating new biotechnological applications, including biofuels and pharmaceuticals.
- **Food safety:** Ensuring the safety and quality of food products is another important area where microbiologists make significant contributions.

Requirements

The Bachelor of Science with a major in microbiology requires a minimum of 120 s.h., including 60-65 s.h. of work for the major, depending on the track. Students must maintain a grade-point average of at least 2.00 in all courses for the major and in all UI courses for the major. Courses for the major may not be taken pass/nonpass. Students must also complete the College of Liberal Arts and Sciences GE CLAS Core.

Students must complete at least 12 s.h. of the required 18-19 s.h. in Department of Microbiology and Immunology courses at the University of Iowa.

The major in microbiology can be pursued on either a pre-medicine or a scholar track.

Students in the pre-medicine track complete admission requirements for the Carver College of Medicine and for most colleges of medicine as an integral part of the completion of their major requirements. This track is recommended for pre-medical, pre-dental, and pre-pharmacy students.

Students in the scholar track pursue a curriculum with streamlined organic chemistry and physics requirements and expanded microbiology and immunology courses, including advanced laboratory and global health studies coursework. The scholar track is recommended for students interested in pursuing graduate training or in developing a career as a microbiologist.

Students may shift from one track to the other during their program of study.

The BS with a major in microbiology requires the following coursework.

Pre-Medicine Track

Students in the pre-medicine track complete the following coursework.

Requirements	Hours
Supporting Coursework	42-43
Microbiology and Immunology Courses	18
Advanced Elective Coursework	3

Pre-Medicine Track: Supporting Coursework

Course #	Title	Hours
All of these:		
BIOL:1411- BIOL:1412	Foundations of Biology - Diversity of Form and Function	8
BMB:3120 & BMB:3130	Biochemistry and Molecular Biology I-II	6
CHEM:1110 & CHEM:1120	Principles of Chemistry I-II	8
CHEM:2210 & CHEM:2220	Organic Chemistry I-II	6
CHEM:2410	Organic Chemistry Laboratory	3
One of these:		
BIOS:4120	Introduction to Biostatistics	3
MATH:1460	Calculus for the Biological Sciences	4
MATH:1550	Engineering Calculus I	4
MATH:1850	Calculus I	4
STAT:3510/ IGPI:3510	Biostatistics	3
One of these sequences:		
PHYS:1511- PHYS:1512	College Physics I-II	8
PHYS:1611- PHYS:1612	Introductory Physics I-II	8

Pre-Medicine Track: Microbiology and Immunology Courses

Students earn a minimum of 18 s.h. in Department of Microbiology and Immunology courses from the following.

Course #	Title	Hours
Both of these:		
MICR:2157	General Microbiology (required with a grade of C or higher)	3
MICR:2158	General Microbiology Laboratory (required with a grade of C or higher)	2
Three of these:		
MICR:3147	Immunology and Human Disease	3
MICR:3159	Bacteria and Human Disease	3
MICR:3168	Viruses and Human Disease	3
MICR:3170	Bacterial Genetics	3
At least 4 s.h. from these:		
MICR:3145	Honors in Microbiology Thesis Preparation	1
MICR:3162	Bacterial Physiology and Cell Biology	2
MICR:3165	Genetics of Bacterial Pathogens Lab and Discussion	3

MICR:3177	Virology Discussion	2
MICR:3178	Virology Laboratory	2
MICR:3182	From Data to Discovery: Hands-On Code-Free Computational Biology	2
MICR:4161	Undergraduate Research in Microbiology	arr.
MICR:4171	Honors Undergraduate Research in Microbiology	arr.
MICR:4175	Topics in Parasitism	1
MICR:5264	Directed Study in Microbiology	arr.

A maximum of 4 s.h. earned in either MICR:4161 Undergraduate Research in Microbiology or MICR:4171 Honors Undergraduate Research in Microbiology may be counted toward the major. However, students earning honors in the major must complete 6 s.h. in MICR:4171 Honors Undergraduate Research in Microbiology; see Honors [p. 3] in this section of the catalog.

Pre-Medicine Track: Advanced Elective Coursework

Course #	Title	Hours
At least 3 s.h. from these:		
BIOL:2512	Fundamental Genetics	4
BIOL:2723	Cell Biology	3
BIOL:3172	Evolution	4
BIOL:3212/ IGPI:3212	Bioinformatics for Beginners	3
BIOL:3314/ IGPI:3314	Genomics	3
BIOL:4213/ GENE:4213/ IGPI:4213	Bioinformatics	2,4
CPH:2230	Finding Patient Zero: The Exploration of Infectious Disease Transmission and Pandemic Threats	3
GHS:2000/ ANTH:2103	Introduction to Global Health Studies	3
GHS:2320/ ANTH:2320	Origins of Human Infectious Disease	3
PCOL:3101	Pharmacology I: A Drug's Fantastic Journey	3
PCOL:3102	Pharmacology II: Mechanisms of Drug Action	3

Additional microbiology and immunology courses (prefix MICR) numbered MICR:3145 to MICR:5264, excluding MICR:3164

Scholar Track

Students in the scholar track complete the following coursework.

Requirements	Hours
Supporting Coursework	35-40
Microbiology and Immunology Courses	19
Advanced Elective Coursework	6

Scholar Track: Supporting Coursework

Course #	Title	Hours
All of these:		
BIOL:1411- BIOL:1412	Foundations of Biology - Diversity of Form and Function	8
BMB:3120 & BMB:3130	Biochemistry and Molecular Biology I-II	6
CHEM:1110 & CHEM:1120	Principles of Chemistry I-II	8
CHEM:2210	Organic Chemistry I	3
One of these:		
PHYS:1400	Basic Physics	4
PHYS:1400 & PHYS:1409	Basic Physics - Basic Physics Lab (PHYS:1400 taken for 3 s.h. and PHYS:1409 taken for 1 s.h.)	4
PHYS:1511- PHYS:1512	College Physics I-II	8
One of these:		
BIOS:4120	Introduction to Biostatistics	3
MATH:1460	Calculus for the Biological Sciences	4
MATH:1550	Engineering Calculus I	4
MATH:1850	Calculus I	4
STAT:3510/ IGPI:3510	Biostatistics	3
One of these:		
GHS:2000/ ANTH:2103	Introduction to Global Health Studies	3
GHS:2320/ ANTH:2320	Origins of Human Infectious Disease	3

Scholar Track: Microbiology and Immunology Courses

Students earn a minimum of 19 s.h. in Department of Microbiology and Immunology courses from the following.

Course #	Title	Hours
Both of these:		
MICR:2157	General Microbiology (required with a grade of C or higher)	3
MICR:2158	General Microbiology Laboratory (required with a grade of C or higher)	2
One of these:		
MICR:3165	Genetics of Bacterial Pathogens Lab and Discussion	3
MICR:3178	Virology Laboratory	2
MICR:4161	Undergraduate Research in Microbiology (must be taken for at least 2 s.h.)	arr.
MICR:4171	Honors Undergraduate Research in Microbiology (must be taken for at least 2 s.h.)	arr.
At least three of these:		
MICR:3147	Immunology and Human Disease	3

MICR:3159	Bacteria and Human Disease	3
MICR:3168	Viruses and Human Disease	3
MICR:3170	Bacterial Genetics	3

Students fulfill the remainder of the 19 s.h. with additional microbiology and immunology courses (prefix MICR) selected from the following.

Course #	Title	Hours
MICR:3145	Honors in Microbiology Thesis Preparation (required for honors in microbiology)	1
MICR:3162	Bacterial Physiology and Cell Biology	2
MICR:3165	Genetics of Bacterial Pathogens Lab and Discussion	3
MICR:3177	Virology Discussion	2
MICR:3178	Virology Laboratory	2
MICR:3182	From Data to Discovery: Hands-On Code-Free Computational Biology	2
MICR:4161	Undergraduate Research in Microbiology	arr.
MICR:4171	Honors Undergraduate Research in Microbiology	arr.
MICR:4175	Topics in Parasitism	1
MICR:5264	Directed Study in Microbiology	arr.

A maximum of 4 s.h. earned in either MICR:4161 Undergraduate Research in Microbiology or MICR:4171 Honors Undergraduate Research in Microbiology may be counted toward the major. However, students earning honors in the major must complete 6 s.h. in MICR:4171 Honors Undergraduate Research in Microbiology; see Honors [p. 3] in this section of the catalog.

Scholar Track: Advanced Elective Coursework

Course #	Title	Hours
6 s.h. from these:		
BIOL:2512	Fundamental Genetics	4
BIOL:2723	Cell Biology	3
BIOL:3172	Evolution	4
BIOL:3212/ IGPI:3212	Bioinformatics for Beginners	3
BIOL:3314/ IGPI:3314	Genomics	3
BIOL:4213/ GENE:4213/ IGPI:4213	Bioinformatics	2,4
BMB:3310/ CBIO:3310/ MMED:3310	Practical Data Science and Bioinformatics	3
CPH:2230	Finding Patient Zero: The Exploration of Infectious Disease Transmission and Pandemic Threats	3
GHS:2000/ ANTH:2103	Introduction to Global Health Studies (if not taken as supporting coursework option)	3

GHS:2320/ ANTH:2320	Origins of Human Infectious Disease (if not taken as supporting coursework option)	3
PCOL:3101	Pharmacology I: A Drug's Fantastic Journey	3
PCOL:3102	Pharmacology II: Mechanisms of Drug Action	3

Additional microbiology and immunology course (prefix MICR) numbered MICR:3145 or above, excluding MICR:3164 and MICR:5875

Honors

Honors in the Major

Students majoring in microbiology (either track) have the opportunity to graduate with honors in the major. They must maintain a cumulative University of Iowa grade-point average (GPA) of at least 3.33 and a GPA of at least 3.33 in work for the major. To graduate with honors in the microbiology major, students must complete an additional 3 s.h. of coursework in microbiology and immunology beyond that required for the major. This must include 6 s.h. in MICR:4171 Honors Undergraduate Research in Microbiology that introduces them to experimental research. The final semester before graduation, students must complete MICR:3145 Honors in Microbiology Thesis Preparation, and must successfully present written and oral presentations of their research projects.

More information on honors in Microbiology can be found here.

University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the university's honors program.

Membership in the UI Honors Program is not required to earn honors in the microbiology major.

Career Advancement

Graduates find employment opportunities in government, hospitals, public health laboratories, research laboratories, and industrial laboratories (food, dairy, chemical, pharmaceutical, and biotechnology companies). Those who pursue advanced degrees have more advanced career opportunities in these same areas, with greater responsibilities and higher salaries, as well as in college and university teaching.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.

Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the university's Four-Year Graduation Plan. Courses in the

major are those required to complete the major; they may be offered by departments other than the major department.

Before the third semester begins: BIOL:1411 Foundations of Biology, CHEM:1110 Principles of Chemistry I, CHEM:1120 Principles of Chemistry II, and an approved calculus or biostatistics course.

Before the fifth semester begins: BIOL:1412 Diversity of Form and Function, CHEM:2210 Organic Chemistry I, MICR:2157 General Microbiology, and MICR:2158 General Microbiology Laboratory.

Before the seventh semester begins: seven more courses in the major and at least 90 s.h. earned toward the degree.

Before the eighth semester begins: another 10–12 s.h. of coursework.

During the eighth semester: enrollment in all remaining coursework in the major, all remaining required GE CLAS Core courses, and a sufficient number of semester hours to graduate.

Sample Plans of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

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- Pre-Medicine Track [p. 4]
- Scholar Track [p. 4]

Pre-Medicine Track

This sample plan is currently being reviewed and will be added at a later date.

Scholar Track

This sample plan is currently being reviewed and will be added at a later date.