Microbiology, B.S.

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

Requirements

The Bachelor of Science with a major in microbiology requires a minimum of 120 s.h., including 63-64 s.h. of work for the major (21-28 s.h. in the Department of Microbiology and Immunology and 35-43 s.h. in supporting course work). Students must maintain a g.p.a. of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences General Education Program.

Students must complete at least 12 s.h. of the required 21-28 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-medical or a scholar track.

Students in the pre-medical 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 course work. 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 B.S. with a major in microbiology in the pre-medical or the scholar track requires the following course work.

| Microbiology and Immunology Courses | 21 |
| Supporting Course Work | 28-29 |
| Pre-Medicine or Scholar Track Course Work | 14 |
| Total Hours | 63-64 |

Microbiology and Immunology Courses

Pre-medical and scholar track students earn 21 s.h. in Department of Microbiology and Immunology courses, as follows.

- **MICR:2157** General Microbiology (with a grade of C or higher) 3
- **MICR:2158** General Microbiology Laboratory (with a grade of C or higher) 2
- **MICR:4163** Seminar: Microbiology (taken the last two semesters before graduation) 2

Additional microbiology and immunology courses (prefix MICR), with at least 14 s.h. in courses numbered MICR:3147 or above, excluding MICR:3164 and MICR:5220. Students select from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICR:3147</td>
<td>Immunology and Human Disease</td>
</tr>
<tr>
<td>MICR:3159</td>
<td>Bacteria and Human Disease</td>
</tr>
<tr>
<td>MICR:3160</td>
<td>Molecular Microbiology</td>
</tr>
<tr>
<td>MICR:3165</td>
<td>Bacteria and Human Disease Laboratory</td>
</tr>
<tr>
<td>MICR:3168</td>
<td>Viruses and Human Disease</td>
</tr>
<tr>
<td>MICR:3170</td>
<td>Microbial Genetics</td>
</tr>
<tr>
<td>MICR:3175</td>
<td>Molecular Microbiology and Genetics Laboratory</td>
</tr>
<tr>
<td>MICR:3178</td>
<td>Virology Laboratory and Discussion</td>
</tr>
<tr>
<td>MICR:3179</td>
<td>Bacterial Diversity and the Human Microbiome</td>
</tr>
<tr>
<td>MICR:4161</td>
<td>Undergraduate Research in Microbiology</td>
</tr>
<tr>
<td>MICR:4171</td>
<td>Honors Undergraduate Research in Microbiology</td>
</tr>
<tr>
<td>MICR:5218</td>
<td>Microscopy for Biomedical Research</td>
</tr>
<tr>
<td>MICR:7217</td>
<td>Integrated Topics in Infectious Diseases</td>
</tr>
</tbody>
</table>

Students must earn a grade of C or higher in BIOL:1411 Foundations of Biology, or in MICR:2157 General Microbiology and MICR:2158 General Microbiology Laboratory, in order to take more advanced Department of Microbiology and Immunology courses.

Students must take MICR:4163 Seminar: Microbiology once for credit during their last two semesters before graduation. They may apply a maximum of 2 s.h. earned in the course toward the major; they are encouraged to take it for 0 s.h. during other semesters after they have completed MICR:2157 General Microbiology and MICR:2158 General Microbiology Laboratory.

A maximum of 4 s.h. earned in MICR:4161 Undergraduate Research in Microbiology may be counted toward the major. However, honors students must complete 23 s.h. of microbiology and immunology courses (prefix MICR) for the major and may count 6 s.h. earned in MICR:4171 Honors Undergraduate Research in Microbiology; see Honors in the Major in this section of the Catalog.

Supporting Course Work

Pre-medical and scholar track students must complete the supporting course work listed below. These courses may not be taken pass/nonpass.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL:1411-1412</td>
<td>Foundations of Biology - Diversity of Form and Function</td>
</tr>
<tr>
<td>CHEM:1110 &amp; CHEM:1120</td>
<td>Principles of Chemistry I-II</td>
</tr>
<tr>
<td>CHEM:2210</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>BIOL:2120 &amp; BIOL:3130</td>
<td>Biochemistry and Molecular Biology I-II</td>
</tr>
</tbody>
</table>

One of these:
BIOS:4120 Introduction to Biostatistics 3
MATH:1460 Calculus for the Biological Sciences 4
MATH:1550 Engineering Mathematics I: Single Variable Calculus 4
MATH:1850 Calculus I 4
STAT:3510/IGPI:3510 Biostatistics 3

In addition, the following course may be recommended for some students:
CNW:2680 The Art and Craft of Creative Nonfiction 3

**Pre-Medicine Track**

Pre-medicine track students must complete the following course work. These courses may not be taken pass/nonpass.

Both of these:
CHEM:2220 Organic Chemistry II 3
CHEM:2410 Organic Chemistry Laboratory 3

One of these sequences:
PHYS:1511-PHYS:1512 College Physics I-II 8
PHYS:1611-PHYS:1612 Introductory Physics I-II 8

**Scholar Track**

Scholar track students must complete the following course work. These courses may not be taken pass/nonpass.

This course:
PHYS:1400 Basic Physics 4

One of these:
GHS:2000/ANTH:2103 Introduction to Global Health Studies 3
GHS:2320/ANTH:2320 Anthropological Perspectives on Human Infectious Disease: Origins and Evolution 3

Scholar track students must earn an additional 4 s.h. of advanced course work chosen from the following.

BIOL:4213/GENE:4213/GPPI:4213 Bioinformatics 4
GHS:2000/ANTH:2103 Introduction to Global Health Studies 3
GHS:2080/GWSS:2080 The Cultural Politics of HIV-AIDS 3
GHS:2320/ANTH:2320 Anthropological Perspectives on Human Infectious Disease: Origins and Evolution 3

Additional work in Department of Microbiology and Immunology courses numbered MICR:3147 or above, excluding MICR:3164 and MICR:5220

Scholar track students must take at least one microbiology and immunology advanced laboratory or research course from these.

MICR:3159 Bacteria and Human Disease 3

**Joint B.S./Ph.D. in Biomedical Science**

Students majoring in microbiology who are interested in earning a doctoral degree may apply to the joint Bachelor of Science/Doctor of Philosophy program in biomedical science (microbiology subprogram). The joint program permits students to count 12 s.h. of credit toward both the B.S. and Ph.D. degree requirements before they have been granted the B.S. degree.

Separate application to each degree program is required. Applicants must be admitted to both programs before they may be admitted to the joint degree program. Contact the Department of Microbiology and Immunology for more information.

**Honors in the Major**

Students majoring in microbiology (either track) have the opportunity to graduate with honors in the major. Departmental honors students must maintain a g.p.a. of at least 3.33, both cumulative and in Department of Microbiology and Immunology courses (prefix MICR). To graduate with honors in the microbiology major, students must complete 23 s.h. of course work in microbiology, including 6 s.h. in MICR:4171 Honors Undergraduate Research in Microbiology, which introduces them to experimental research. At the end of their research, they must successfully present written and oral reports.

**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.

**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: BIO: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 course work

During the eighth semester: enrollment in all remaining course work in the major, all remaining required General Education courses, and a sufficient number of semester hours to graduate

Sample Plans of Study

Microbiology (B.S.)

Pre-Medicine Track

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM:1110</td>
<td>Principles of Chemistry I (also GE: Natural Sciences with a lab) 1</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1460</td>
<td>Calculus for the Biological Sciences (also GE: Quantitative or Formal Reasoning) 2</td>
<td>4</td>
</tr>
<tr>
<td>RHET:1030</td>
<td>Rhetoric (GE: Rhetoric or other General Education course) 2</td>
<td>4</td>
</tr>
<tr>
<td>Elective course 3</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CSI:1600</td>
<td>Success at Iowa</td>
<td>2</td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL:1411</td>
<td>Foundations of Biology</td>
<td>4</td>
</tr>
<tr>
<td>CHEM:1120</td>
<td>Principles of Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>ENGL:1200</td>
<td>The Interpretation of Literature (GE: Interpretation of Literature )</td>
<td>3</td>
</tr>
<tr>
<td>GE: Diversity and Inclusion</td>
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<td>3</td>
</tr>
<tr>
<td>Elective course</td>
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<td>1</td>
</tr>
<tr>
<td>Hours</td>
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</table>

Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL:1412</td>
<td>Diversity of Form and Function</td>
<td>4</td>
</tr>
<tr>
<td>CHEM:2210</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>GE: Historical Perspectives</td>
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<td>3</td>
</tr>
<tr>
<td>GE: World Languages or elective course 4</td>
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<td>3-5</td>
</tr>
<tr>
<td>Elective course</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td>15-17</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MICR:2157</td>
<td>General Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>MICR:2158</td>
<td>General Microbiology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM:2220</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>GE: International and Global Issues</td>
<td></td>
<td>3</td>
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<tr>
<td>GE: World Languages or elective course 4</td>
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<td>3-5</td>
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<td>Elective course</td>
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<td>2</td>
</tr>
<tr>
<td>Hours</td>
<td></td>
<td>15-17</td>
</tr>
</tbody>
</table>

Total Hours 122-135

1 Enrollment in chemistry and math courses require completion of placement exams.
2 General Education (GE) courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses. For more information, view the General Education Program.
3 Students may use their elective courses to complete a double major, minors, or certificates.
4 Students who have completed four years of a single language in high school have satisfied the College of Liberal Arts and Sciences GE: World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.

Scholar Track

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
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<td>Principles of Chemistry I (also GE: Natural Sciences with a lab) 1</td>
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<td>4</td>
</tr>
<tr>
<td>Elective course 3</td>
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</table>

Total Hours 15-17

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<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td><strong>CSI:1600</strong></td>
<td>Success at Iowa</td>
<td>15</td>
<td></td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BIOL:1411</td>
<td>Foundations of Biology</td>
<td>4</td>
</tr>
<tr>
<td>CHEM:1120</td>
<td>Principles of Chemistry II</td>
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<tr>
<td>ENGL:1200</td>
<td>The Interpretation of Literature</td>
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<tr>
<td>GE: Diversity and Inclusion</td>
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<td>Elective course</td>
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**Second Year**

**Fall**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>MICR:2157</td>
<td>General Microbiology</td>
<td>3</td>
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<tr>
<td>MICR:2158</td>
<td>General Microbiology Laboratory</td>
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<tr>
<td>BIOL:1412</td>
<td>Diversity of Form and Function</td>
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<td>CHEM:2210</td>
<td>Organic Chemistry I</td>
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<td>GE: World Languages or elective course</td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td>GHS:2000</td>
<td>Introduction to Global Health Studies</td>
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<tr>
<td>PHYS:1400</td>
<td>Basic Physics</td>
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<td>GE: International and Global Issues</td>
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<td>GE: World Languages or elective course</td>
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**Third Year**

**Fall**

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<th>Course Title</th>
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<tbody>
<tr>
<td>BIOC:3120</td>
<td>Biochemistry and Molecular Biology I</td>
<td>3</td>
</tr>
<tr>
<td>Major: advanced microbiology course</td>
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<td>3</td>
</tr>
<tr>
<td>Major: advanced microbiology laboratory course</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>GE: Values and Culture</td>
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<td>3</td>
</tr>
<tr>
<td>GE: World Languages or elective course</td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC:3130</td>
<td>Biochemistry and Molecular Biology II</td>
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</tr>
<tr>
<td>Major: advanced microbiology course</td>
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<td>3</td>
</tr>
<tr>
<td>GE: Literary, Visual, and Performing Arts</td>
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<td>3</td>
</tr>
<tr>
<td>GE: World Languages or elective course</td>
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<td>3-5</td>
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<td>Elective course</td>
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**Fourth Year**

**Fall**

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<tr>
<th>Course Code</th>
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<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major: advanced microbiology course</td>
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<td>3</td>
</tr>
<tr>
<td>Major: advanced microbiology course</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Major: optional research</td>
<td></td>
<td>1-3</td>
</tr>
<tr>
<td>GE: Historical Perspectives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Elective course</td>
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**Spring**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MICR:4163</td>
<td>Seminar: Microbiology</td>
<td>2</td>
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<td>Major: advanced microbiology course</td>
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<tr>
<td>Major: optional research</td>
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<td>1-3</td>
</tr>
<tr>
<td>GE: Social Sciences</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

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**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.