

MICROBIOLOGY MAJOR

Program Curriculum

| Code | Title | Credits |
|---|---|---------|
| Degree Core Requirements | | |
| BIOL 2004 | Genetics ¹ | 3 |
| BIOL 2134 | Cell Function and Differentiation ¹ | 3 |
| BIOL 2604 | General Microbiology ^{1,2,3} | 3 |
| BIOL 2614 | General Microbiology Laboratory ^{1,2} | 2 |
| BIOL 4624 | Microbial Genetics ¹ | 3 |
| BIOL 4634 | Microbial Physiology ¹ | 3 |
| BIOL 3764 | Careers in Microbiology ¹ | 3 |
| BCHM 3114 | Biochemistry for Biotechnology and the Life Sciences ¹ | 3 |
| Subtotal | | 23 |
| Major Requirements | | |
| BIOL 1004 | Biology Orientation Seminar ^{3,4} | 1 |
| BIOL 1115 | Principles of Biology Laboratory ^{2,3} | 1 |
| BIOL 1116 | Principles of Biology Laboratory ^{2,3} | 1 |
| CHEM 1035 | General Chemistry ^{2,3} | 3 |
| CHEM 1036 | General Chemistry ^{2,3} | 3 |
| CHEM 1045 | General Chemistry Laboratory ³ | 1 |
| CHEM 1046 | General Chemistry Laboratory ³ | 1 |
| CHEM 2535 | Organic Chemistry ^{1,3} | 3 |
| CHEM 2536 | Organic Chemistry ^{1,3} | 3 |
| CHEM 2545 | Organic Chemistry Laboratory ^{1,3} | 1 |
| CHEM 2546 | Organic Chemistry Laboratory ^{1,3} | 1 |
| PHYS 2205 | General Physics ^{1,3} | 3 |
| PHYS 2206 | General Physics ^{1,3} | 3 |
| PHYS 2215 | General Physics Laboratory ^{1,3} | 1 |
| PHYS 2216 | General Physics Laboratory ^{1,3} | 1 |
| Subtotal | | 27 |
| Elective Courses | | |
| BIOL 3774 & BIOL 3104 or BIOL 4644 | Molecular Biology and Cell and Molecular Biology Laboratory ¹ or Microbial Molecular Genetics and Physiology Laboratory | 3-4 |
| BIOL 4674 & BIOL 4724 or BIOL 4704 & BIOL 4714 | Pathogenic Bacteriology and Pathogenic Bacteriology Lab ¹ or Immunology and Immunology Laboratory | 4-5 |
| Select two of the following: (if not taken above) | | 8-9 |
| BIOL 3254 & BIOL 3264 | Medical and Veterinary Entomology and Medical and Veterinary Entomology Laboratory ¹ | |
| BIOL 3454 | Introductory Parasitology ¹ | |
| BIOL 3604 | Food Microbiology ¹ | |
| BIOL 4164 | Environmental Microbiology ¹ | |
| BIOL 4644 | Microbial Molecular Genetics and Physiology Laboratory ¹ | |
| BIOL 4674 & BIOL 4724 | Pathogenic Bacteriology and Pathogenic Bacteriology Lab ¹ | |

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| BIOL 4704 & BIOL 4714 | Immunology and Immunology Laboratory ¹ | |
| BIOL 4824 | Bioinformatics Methods ¹ | |
| BIOL 4994 | Undergraduate Research ^{3,5} | |
| PPWS 4104 | Plant Pathology ¹ | |
| Select one of the following: (if not taken above) | | 3-4 |
| BIOL 3254 | Medical and Veterinary Entomology ¹ | |
| BIOL 3454 | Introductory Parasitology ¹ | |
| BIOL 3604 | Food Microbiology ¹ | |
| BIOL 4164 | Environmental Microbiology ¹ | |
| BIOL 4644 | Microbial Molecular Genetics and Physiology Laboratory ¹ | |
| BIOL 4664 | Virology ¹ | |
| BIOL 4674 | Pathogenic Bacteriology ¹ | |
| BIOL 4684 | Microbiomes | |
| BIOL 4704 | Immunology ¹ | |
| BIOL 4734 | Inflammation Biology ¹ | |
| BIOL 4804 | Prokaryotic Diversity ¹ | |
| BIOL 4824 | Bioinformatics Methods ¹ | |
| BIOL 4994 | Undergraduate Research ³ | |
| FST 4634 | Epidemiology Foodborne Disease ¹ | |
| PPWS 4104 | Plant Pathology ¹ | |
| PPWS 4114 | Microbial Forensics and Biosecurity ¹ | |
| Subtotal | | 18-22 |
| Free Electives | | |
| Select remaining credit hours to reach 120 required credit hours | | 3-7 |
| Subtotal | | 3-7 |
| Pathways to General Education | | |
| <i>Pathways Concept 1 - Discourse</i> | | |
| ENGL 1105 | First-Year Writing (1F) | 3 |
| ENGL 1106 | First-Year Writing (1F) | 3 |
| Select three credits in Pathway 1a (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G01A) | | 3 |
| <i>Pathways Concept 2 - Critical Thinking in the Humanities</i> | | |
| Select six credits in Pathway 2 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G02) | | 6 |
| <i>Pathways Concept 3 - Reasoning in the Social Sciences</i> | | |
| Select six credits in Pathway 3 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G03) | | 6 |
| <i>Pathways Concept 4 - Reasoning in the Natural Sciences</i> | | |
| BIOL 1105 | Principles of Biology ^{2,3} | 3 |
| BIOL 1106 | Principles of Biology ^{2,3} | 3 |
| <i>Pathways Concept 5 - Quantitative and Computational Thinking</i> | | |
| MATH 1025 | Elementary Calculus (5F) ³ | 3 |
| MATH 1026 | Elementary Calculus (5F) ³ | 3 |
| STAT 3615 | Biological Statistics (5A) ¹ | 3 |
| <i>Pathways Concept 6 - Critique and Practice in Design and the Arts</i> | | |
| Select 6 credits = 3 design + 3 arts, or 6 integrated design/arts | | 6 |
| <i>Pathways Concept 7 - Critical Analysis of Identity and Equity in the United States</i> | | |
| Select three credits in Pathway 7 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G07) | | 3 |

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| Subtotal | 45 |
| Total | 120 |

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| BCHM 3114 | Biochemistry for Biotechnology and the Life Sciences | 3 |
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¹ Some courses listed on this checklist may have prerequisites; please consult the University Course Catalog or check with your advisor.

² Students must earn a grade of "C" or better in BIOL 1105 Principles of Biology, BIOL 1106 Principles of Biology, BIOL 1115 Principles of Biology Laboratory, BIOL 1116 Principles of Biology Laboratory, BIOL 2604 General Microbiology, BIOL 2614 General Microbiology Laboratory, CHEM 1035 General Chemistry, CHEM 1036 General Chemistry, or the equivalent. Only two attempts, including course withdrawals with grade of "W", are allowed for each course.

³ Course has acceptable substitutions (see below)

⁴ BIOL 1004 Biology Orientation Seminar is required but will not count as major elective credit or be used to calculate in-major GPA.

⁵ To count, students must complete two semesters of BIOL 4994 Undergraduate Research for a combined total of at least 4 credits.

Informational notes for Microbiology B.S. students:

1. if you are also enrolled as a BIOL (no option) student, you may count a maximum of 9 credits from the following courses toward the 22 required BIOL elective credits (section 2c of BIOL checklist):

| Code | Title | Credits |
|-----------|--|---------|
| BIOL 3104 | Cell and Molecular Biology Laboratory | 1 |
| BIOL 3774 | Molecular Biology | 3 |
| BIOL 3454 | Introductory Parasitology | 4 |
| BIOL 3604 | Food Microbiology | 4 |
| BIOL 4164 | Environmental Microbiology | 3 |
| BIOL 4624 | Microbial Genetics | 3 |
| BIOL 4634 | Microbial Physiology | 3 |
| BIOL 4644 | Microbial Molecular Genetics and Physiology Laboratory | 3 |
| BIOL 4664 | Virology | 3 |
| BIOL 4674 | Pathogenic Bacteriology | 3 |
| BIOL 4704 | Immunology | 3 |
| BIOL 4714 | Immunology Laboratory | 1 |
| BIOL 4734 | Inflammation Biology | 3 |
| BIOL 4804 | Prokaryotic Diversity | 3 |
| BIOL 4824 | Bioinformatics Methods | 3 |
| BIOL 4994 | Undergraduate Research | 1-19 |
| BCHM 3114 | Biochemistry for Biotechnology and the Life Sciences | 3 |
| PPWS 4114 | Microbial Forensics and Biosecurity | 3 |
| FST 4634 | Epidemiology Foodborne Disease | 3 |

2. if you are also enrolled as a Biomedical (BIOM) Option student, you may count a maximum of 3 courses from the following courses as Biomedical Option electives:

| Code | Title | Credits |
|-----------|---------------------------|---------|
| BIOL 3774 | Molecular Biology | 3 |
| BIOL 3454 | Introductory Parasitology | 4 |
| BIOL 4664 | Virology | 3 |
| BIOL 4674 | Pathogenic Bacteriology | 3 |
| BIOL 4704 | Immunology | 3 |
| BIOL 4734 | Inflammation Biology | 3 |
| BIOL 4824 | Bioinformatics Methods | 3 |

Pathways to General Education Requirements: 45 Credits

MICB Degree Core Requirements: 23 Credits

MICB Major Requirements: 27 Credits

MICB Electives: 18-22 Credits

Total Free Electives: 3-7 Credits

Total Credits Required for Graduation: 120 Credits

Notes:

- Students must have an in-major and overall GPA of 2.0 to graduate.
- All BIOL, MATH, and STAT courses, and all courses taken to fulfill Major Microbiology, Degree Core, and MICB Elective requirements (except BIOL 1004 Biology Orientation Seminar) will be used to calculate in-major GPA.

Acceptable Substitutions

Required Course: Acceptable Substitution(s)

- BIOL 1004 Biology Orientation Seminar: Any approved First-Year Experience (FYE) course
- BIOL 1105 Principles of Biology, BIOL 1115 Principles of Biology Laboratory: BIOL 1205H
- BIOL 1106 Principles of Biology, BIOL 1116 Principles of Biology Laboratory: BIOL 1206H
- CHEM 1035 General Chemistry-CHEM 1036 General Chemistry: CHEM 1055 General Chemistry for Chemistry Majors -CHEM 1056 General Chemistry for Chemistry Majors
- CHEM 1045 General Chemistry Laboratory-CHEM 1046 General Chemistry Laboratory: CHEM 1065 General Chemistry for Chemistry Majors Lab-CHEM 1066 General Chemistry for Chemistry Majors Lab
- CHEM 2535 Organic Chemistry-CHEM 2536 Organic Chemistry: CHEM 2565 Principles of Organic Chemistry-CHEM 2566 Principles of Organic Chemistry
- CHEM 2545 Organic Chemistry Laboratory-CHEM 2546 Organic Chemistry Laboratory: CHEM 2555 Organic Synthesis and Techniques Lab-CHEM 2556 Organic Synthesis and Techniques Lab
- PHYS 2205 General Physics, PHYS 2215 General Physics Laboratory: PHYS 2305 Foundations of Physics
- PHYS 2206 General Physics, PHYS 2216 General Physics Laboratory: PHYS 2306 Foundations of Physics
- MATH 1025 Elementary Calculus: MATH 1225 Calculus of a Single Variable
- MATH 1026 Elementary Calculus: MATH 1226 Calculus of a Single Variable

Satisfactory Progress Toward Degree

1. Students must earn a grade of "C" or better in BIOL 1105 Principles of Biology, BIOL 1106 Principles of Biology, BIOL 1115 Principles of Biology Laboratory, BIOL 1116 Principles of Biology Laboratory, CHEM 1035 General Chemistry, CHEM 1036 General Chemistry or equivalent upon attempting 45 credit hours (including transfer credit, advance placement or IB credit, advance standing credit, credit by examination, courses taken P/F, and courses completed with a grade of "W"). Only two attempts are allowed for each course.
2. Students must achieve an overall GPA of 2.0 and in-major GPA of 2.2 upon attempting 45 credit hours (including transfer credit,

advanced placement or IB credit, advance standing credit, credit by examination, courses taken P/F, and courses completed with a grade of "W").

3. All BIOL courses and all courses taken to fulfill Core Microbiology, Core Restricted Elective, and Core Science and Math requirements (except BIOL 1004 Biology Orientation Seminar) will be used to calculate in-major GPA.
4. The following courses must be completed by the time the student has attempted 72 hours.
 - BIOL 1105 Principles of Biology, BIOL 1106 Principles of Biology, BIOL 1115 Principles of Biology Laboratory, BIOL 1116 Principles of Biology Laboratory or equivalent
 - CHEM 1035 General Chemistry, CHEM 1036 General Chemistry, CHEM 1045 General Chemistry Laboratory, CHEM 1046 General Chemistry Laboratory or equivalent
 - MATH 1025 Elementary Calculus, MATH 1026 Elementary Calculus or equivalent

College of Science Foreign Language Requirement

Students who did not successfully complete at least two years of a single foreign, classical, or sign language during high school must successfully complete six semester hours of a single foreign, classical, or sign language at the college level. Courses taken to meet this requirement do not count toward the hours required for graduation. Please consult the Undergraduate Catalog for details.