

BIOLOGY B.S. - GENETICS AND EVOLUTION

Bachelor of Science - Biology; Genetics and Evolution Concentration

College of Humanities & Sciences

Degree Specific Credits: 70-92

Required Cumulative GPA: 2.0

Catalog Year: 2018-2019

Note: The Genetics and Evolution concentration is for students interested in genetics and evolutionary biology, including molecular genetics, population genetics, ecological genetics, and genomics. This concentration is a graduate prep program, and is for students interested in academia or research jobs in private or government laboratories. It is also an excellent concentration for students interested in a professional health program such as medical school or a genetic counseling graduate program.

General Education Requirements

Information regarding these requirements can be found in the General Education Section (<http://catalog.umt.edu/academics/general-education-requirements>) of the catalog.

Summary

| Code | Title | Hours |
|------|---|-------|
| | Biology/Microbiology Lower-Division Core | 17 |
| | Upper-Division Core Courses Required by the Genetics & Evolution Concentration | 11 |
| | Additional Upper-Division Courses Required for the Genetics & Evolution Concentration | 16-22 |
| | Biochemistry | |
| | Genetics/Evolution Depth Courses | |
| | Physiology Requirement | |
| | Required Courses Outside of the Major | 26-42 |
| | Mathematics - Calculus | |
| | Mathematics - Statistics | |
| | Chemistry | |
| | Physics | |
| | Advanced College Writing Requirement | |
| | Total Hours | 70-92 |

Biology/Microbiology Lower-Division Core

Note: The lower division core should be completed before attempting most upper division major courses. AP Biology credit with a score of 3 may be substituted for either BIOB 160N/BIOB 161N or BIOB 170N/BIOB 171N.

| Code | Title | Hours |
|-----------|---|-------|
| | Complete all of the following courses: | |
| BIOB 160N | Principles of Living Systems | 3 |

| | | |
|-------------|--------------------------------|----|
| BIOB 161N | Prncpls of Living Systems Lab | 1 |
| BIOB 170N | Prncpls Biological Diversity | 3 |
| BIOB 171N | Prncpls Biological Dvrsty Lab | 2 |
| BIOB 260 | Cellular and Molecular Biology | 4 |
| BIOB 272 | Genetics and Evolution | 4 |
| Total Hours | | 17 |

Minimum Required Grade: C-

Upper-Division Core Courses Required by the Genetics & Evolution Concentration

| Code | Title | Hours |
|-------------|---|-------|
| | Complete all of the following courses: | |
| BIOB 375 | General Genetics | 3 |
| BIOB 486 | Genomics | 3 |
| BIOE 370 | General Ecology | 3 |
| BIOE 371 | Gen Ecology Lab (equiv to 271) | 2 |
| Total Hours | | 11 |

Minimum Required Grade: C-

Additional Upper-Division Courses Required for the Genetics & Evolution Concentration

Biochemistry

Note: If introductory chemistry is completed, then BCH 380 must be taken. Either BCH 380 or BCH 480-BCH 482 may be taken if the advanced chemistry sequence is completed.

| Code | Title | Hours |
|-------------------|--|-------|
| | Complete one of the following courses: | 4-6 |
| BCH 380 | Biochemistry | |
| BCH 480 & BCH 482 | Advanced Biochemistry I and Advanced Biochemistry II | |
| Total Hours | | 4-6 |

Minimum Required Grade: C-

Genetics/Evolution Depth Courses

| Code | Title | Hours |
|-------------|---|-------|
| | Complete three of the following courses: | 9-12 |
| BIOB 480 | Conservation Genetics | |
| BIOB 483 | Phylogenics and Evolution | |
| BIOB 488 | Programming for Biology | |
| BIOE 403 | Vert Design & Evolution | |
| BIOE 406 | Behavior & Evolution | |
| BIOL 484 | Plant Evolution | |
| BIOM 410 | Microbial Genetics | |
| BIOM 415 | Microbial Dvrsty Eclgy & Evltn | |
| CSCI 451 | Computational Biology | |
| Total Hours | | 9-12 |

Minimum Required Grade: C-

Physiology Requirement

| Code | Title | Hours |
|---|---|-------|
| Complete one of the following courses (labs must be taken if available): | | |
| BIOB 425 | Adv Cell & Molecular Biology | 3-4 |
| BIOL 435 | Comparative Animal Physiology | |
| BIOM 450 & BIOM 451 | Microbial Physiology and Microbial Physiology Lab | 3-4 |
| BIOO 433 & BIOO 434 | Plant Physiology and Plant Physiology Lab | |
| Total Hours | | 3-4 |

Minimum Required Grade: C-

Required Courses Outside of the Major*Mathematics - Calculus*

Note: Student should choose M 171 if they plan to take additional calculus courses or if they plan to double major or minor in a field that requires more calculus (e.g. math, physics, biochemistry, computer science).

| Code | Title | Hours |
|---|------------------|-------|
| Complete one of the following courses: | | |
| M 162 | Applied Calculus | 4 |
| M 171 | Calculus I | |
| Total Hours | | 4 |

Minimum Required Grade: C-

Mathematics - Statistics

| Code | Title | Hours | |
|--|--|-------|--|
| Complete either one semester or a full year of statistics from the following: | | | |
| One Semester: | | | |
| STAT 216 | Introduction to Statistics | 4-8 | |
| Full Year: | | | |
| STAT 451 & STAT 452 | Statistical Methods I and Statistical Methods II | | |
| STAT 457 & STAT 458 | Computer Data Analysis I and Computer Data Analysis II | | |
| Total Hours | | 4-8 | |

Minimum Required Grade: C-

Chemistry**Notes:**

- Students who begin in the advanced chemistry sequence may substitute those courses for introductory sequence courses at the discretion of the major advisor.
- Students should choose the advanced sequence for graduate preparation.

| Code | Title | Hours |
|--|-----------------------------------|-------|
| Complete a sequence of general and organic chemistry: | | |
| Introductory Chemistry (8 credits): | | |
| CHMY 121N | Introduction to General Chemistry | 8-20 |

| | | |
|---|---|------|
| CHMY 123 & CHMY 124 | Introduction to Organic and Biochemistry and Introduction to Organic and Biochemistry Lab | 8-20 |
| Advanced Chemistry (20 credits): | | |
| CHMY 141N & CHMY 142N | College Chemistry I and College Chemistry I Lab | 8-20 |
| CHMY 143N & CHMY 144N | College Chemistry II and College Chemistry II Lab | |
| CHMY 221 & CHMY 222 | Organic Chemistry I and Organic Chemistry I Lab | 8-20 |
| CHMY 223 & CHMY 224 | Organic Chemistry II and Organic Chemistry II Lab | |
| Total Hours | | 8-20 |

Minimum Required Grade: C-

Physics

| Code | Title | Hours |
|---|--|-------|
| Complete one of the following Physics sequences: | | |
| Algebra- and Trigonometry-based Physics: | | |
| PHSX 205N & PHSX 206N | College Physics I and College Physics I Laboratory | 10 |
| PHSX 207N & PHSX 208N | College Physics II and College Physics II Laboratory | |
| Calculus-based Physics: | | |
| PHSX 215N & PHSX 216N | Fund of Physics w/Calc I and Physics Laboratory I w/Calc | 10 |
| PHSX 217N & PHSX 218N | Fund of Physics w/Calc II and Physics Laboratory II w/Calc (require M 171 and M 172) | |
| Total Hours | | 10 |

Minimum Required Grade: C-

Advanced College Writing Requirement

Rule: To complete the Advanced College Writing Requirement, Biology students take 2 or 3 partial writing courses (either three 1/3 writing courses or one 1/3 writing course and one 2/3 writing course) or one complete writing course. The Genetics & Evolution concentration requires one 2/3 writing course: BIOE 371. The Advanced College Writing Requirement is completed with one additional course, chosen from any of the following.

1/3 Advanced Writing Courses

| Code | Title | Hours |
|----------|---------------------------------|-------|
| BCH 482 | Advanced Biochemistry II | 3 |
| BIOB 410 | Immunology | 3 |
| BIOB 425 | Adv Cell & Molecular Biology | 3 |
| BIOB 483 | Phylogenics and Evolution | 3 |
| BIOE 403 | Vert Design & Evolution | 5 |
| BIOE 409 | Behavior & Evolution Discussion | 1 |
| BIOE 428 | Freshwater Ecology | 5 |
| BIOL 484 | Plant Evolution | 3 |
| BIOM 402 | Medical Bacteriology& Mycology | 3 |
| BIOO 320 | General Botany | 5 |
| BIOO 434 | Plant Physiology Lab | 1 |

| | | |
|----------|-------------|---|
| BIOO 470 | Ornithology | 4 |
| BIOO 475 | Mammalogy | 4 |

Minimum Required Grade: C-

2/3 Advanced Writing Courses

| Code | Title | Hours |
|-------------|--------------------------------|--------------|
| BCH 486 | Biochemistry Research Lab | 3 |
| BCH 499 | Senior Thesis/Capstone | 3-6 |
| BIOB 411 | Immunology Laboratory | 2 |
| BIOB 499 | Undergraduate Thesis | 3-6 |
| BIOE 342 | Field Ecology | 5 |
| BIOE 371 | Gen Ecology Lab (equiv to 271) | 2 |
| BIOM 411 | Exprmntl Microbial Genetcs Lab | 1 |
| BIOM 499 | Undergraduate Thesis | 3-6 |

Minimum Required Grade: C-

Complete Advanced Writing Course

| Code | Title | Hours |
|-------------|-------------------------------|--------------|
| BIOH 462 | Principles Medical Physiology | 3 |

Minimum Required Grade: C-
