BIOLOGY - GENETICS AND EVOLUTION

Bachelor of Science - Biology; Genetics and Evolution Concentration

College Humanities & Sciences

Degree Specific Credits: 70

Required Cumulative GPA: 2.0

Catalog Year: 2017-2018

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

Biology/Microbiology Lower Division Core 17

Upper Division Core Courses Required by the Genetics & Evolution Concentration 11

Additional UD Major 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

Upper Division Writing Expectation for the Major 3-8

Total Hours 73-100

Biology/Microbiology Lower Division Core

Rule: All of the following courses are required.

Note: The lower division core should be completed before attempting most upper division major courses.

AP Biology credit may be substituted for either BIOB 160N/BIOB 161N or BIOB 170N/BIOB 171N.

BIOB 160N Principles of Living Systems 3

BIOB 161N Prncpls of Living Systems Lab 1

BIOB 170N Principals Biological Diversity 3

BIOB 171N Principals 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

Rule: All of the following courses are required.

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 UD Major Courses Required for the Genetics & Evolution Concentration

Minimum Required Grade: C-

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.

Select one of the following: 4-6

BCH 380 Biochemistry

BCH 480 Advanced Biochemistry I

& BCH 482 and Advanced Biochemistry II

Total Hours 4-6

Minimum Required Grade: C-

Genetics/Evolution Depth Courses

Select at least three of the following: 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

Select at least one of the following (labs must be taken if available): 3-4

BIOB 425 Adv Cell & Molecular Biology

BIOL 435 Comparative Animal Physiology
Required Courses Outside of the Major
Minimum Required Grade: C-

**Mathematics - Calculus**
Rule: Complete one of the following calculus courses

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

- M 162 Applied Calculus 4
  - or M 171 Calculus I

Total Hours 4
Minimum Required Grade: C-

**Mathematics - Statistics**
Select either one semester or a full year of statistics from the following:

One Semester:
- STAT 216 Introduction to Statistics

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**
Select either one or two years of chemistry from the following:

One Year:
- CHMY 121N Introduction to General Chemistry
- CHMY 123 Introduction to Organic and Biochemistry
  - & CHMY 124 and Introduction to Organic and Biochemistry Lab

Two Years:
- CHMY 141N College Chemistry I
- CHMY 142N College Chemistry I Lab
- CHMY 143N College Chemistry II
- CHMY 144N College Chemistry II Lab
- CHMY 221 Organic Chemistry I
  - & CHMY 222 and Organic Chemistry I Lab
- CHMY 223 Organic Chemistry II
  - & CHMY 224 and Organic Chemistry II Lab

Total Hours 8-20
Minimum Required Grade: C-

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**Physics**
Rule: All of the following courses are required

Select one of the following physics sequences:

**Algebra- and Trigonometry-based:**
- PHSX 205N College Physics I Laboratory
- PHSX 207N College Physics II Laboratory

**Calculus-based:**
- PHSX 215N Fund of Physics w/Calc I
  - & PHSX 216N Physics Laboratory I w/Calc
- PHSX 217N Fund of Physics w/Calc II
  - & PHSX 218N Physics Laboratory II w/Calc

Total Hours 10
Minimum Required Grade: C-

**Advanced College Writing Requirement**
Rule: Complete the equivalent of a full writing course (either three 1/3 writing courses or one 2/3 writing course + one 1/3 writing course or one complete writing course)

**Note:** To meet 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.

Minimum Required Grade: C-

**1/3 Advanced Writing Courses**
- 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**
- 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) 3
**BIOM 411**  Exprmntl Microbial Genetics Lab  1
**BIOM 499**  Undergraduate Thesis  3-6

Minimum Required Grade: C-

**Complete Advanced Writing Course**
**BIOH 462**  Principles Medical Physiology  3

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**Exception to the Modern/Classical Languages Requirement**

**Rule:** Choose one of the following Math courses

**Note:** The Division of Biological Sciences has been granted an exception to the Modern/Classical Language Requirement. Either of these Calculus courses (required by the major) will satisfy this requirement.

- M 162  Applied Calculus  4
- or M 171  Calculus I

Total Hours  4

Minimum Required Grade: C-