**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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 160N</td>
<td>Principles of Living Systems</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 161N</td>
<td>Prncpls of Living Systems Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIOB 170N</td>
<td>Principals Biological Diversity</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 171N</td>
<td>Principals Biological Dvrsity Lab</td>
<td>2</td>
</tr>
<tr>
<td>BIOB 260</td>
<td>Cellular and Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOB 272</td>
<td>Genetics and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Upper Division Core Courses Required by the Genetics & Evolution Concentration

Rule: All of the following courses are required.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 375</td>
<td>General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 486</td>
<td>Genomics</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 371</td>
<td>Gen Ecology Lab (equiv to 271)</td>
<td>2</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 380</td>
<td>Biochemistry</td>
<td></td>
</tr>
<tr>
<td>BCH 480</td>
<td>Advanced Biochemistry I</td>
<td></td>
</tr>
<tr>
<td>BCH 482</td>
<td>and Advanced Biochemistry II</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>4-6</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Genetics/Evolution Depth Courses

Select at least three of the following: 9-12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 480</td>
<td>Conservation Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOB 483</td>
<td>Phylogenics and Evolution</td>
<td></td>
</tr>
<tr>
<td>BIOB 488</td>
<td>Programming for Biology</td>
<td></td>
</tr>
<tr>
<td>BIOE 403</td>
<td>Vert Design &amp; Evolution</td>
<td></td>
</tr>
<tr>
<td>BIOE 406</td>
<td>Behavior &amp; Evolution</td>
<td></td>
</tr>
<tr>
<td>BIOL 484</td>
<td>Plant Evolution</td>
<td></td>
</tr>
<tr>
<td>BIOM 410</td>
<td>Microbial Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOM 415</td>
<td>Microbial Dvrsy Eclgy &amp; Evltn</td>
<td></td>
</tr>
<tr>
<td>CSCI 451</td>
<td>Computational Biology</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>9-12</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Physiology Requirement

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 425</td>
<td>Adv Cell &amp; Molecular Biology</td>
<td></td>
</tr>
<tr>
<td>BIOL 435</td>
<td>Comparative Animal Physiology</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>3-4</td>
</tr>
</tbody>
</table>
BIOM 450  Microbial Physiology
& BIOM 451  and Microbial Physiology Lab

BIO 433  Plant Physiology
& BIO 434  and Plant Physiology Lab

Total Hours 3-4
Minimum Required Grade: C-

**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  4

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  Statistical Methods I
  & STAT 452  and Statistical Methods II
- STAT 457  Computer Data Analysis I
  & STAT 458  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-

**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
  & PHSX 206N  and College Physics I Laboratory
- PHSX 207N  College Physics II
  & PHSX 208N  and College Physics II Laboratory

**Calculus-based:**
- PHSX 215N  Fund of Physics w/Calc I
  & PHSX 216N  and Physics Laboratory I w/Calc
- PHSX 217N  Fund of Physics w/Calc II
  & PHSX 218N  and 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
- BIO 320  General Botany  5
- BIO 434  Plant Physiology Lab  1
- BIO 470  Ornithology  4
- BIO 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)  2
BIOM 411  Exprmntl Microbial Genetcs Lab  1
BIOM 499  Undergraduate Thesis  3-6

Minimum Required Grade: C-

**Complete Advanced Writing Course**

BIOH 462  Principles Medical Physiology  3

---

**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-