# 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

<table>
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<th>Biology/Microbiology Lower Division Core</th>
<th>Upper Division Core Courses Required by the Genetics &amp; Evolution Concentration</th>
<th>Additional UD Major Courses Required for the Genetics &amp; Evolution Concentration</th>
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</thead>
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<tr>
<td>Rule: All of the following courses are required.</td>
<td>17</td>
<td>11</td>
<td>Minimum Required Grade: C-</td>
</tr>
<tr>
<td><strong>Minimum Required Grade: C-</strong></td>
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</tbody>
</table>

## 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</th>
<th>Title</th>
<th>Hours</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>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</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>
</tbody>
</table>

## Additional UD Major Courses Required for the Genetics & Evolution Concentration

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

Minimum Required Grade: C-

## Genetics/Evolution Depth Courses

Select at least three of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 480</td>
<td>Conservation Genetics</td>
<td>9-12</td>
</tr>
<tr>
<td>BIOB 483</td>
<td>Phylgenics 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 Dvrsty Eclgy &amp; Evltn</td>
<td></td>
</tr>
<tr>
<td>CSCI 451</td>
<td>Computational Biology</td>
<td></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

## Physiology Requirement

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 425</td>
<td>Adv Cell &amp; Molecular Biology</td>
<td>3-4</td>
</tr>
<tr>
<td>BIOL 435</td>
<td>Comparative Animal Physiology</td>
<td></td>
</tr>
</tbody>
</table>
Biology - Genetics and Evolution

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 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 Statistical Methods I
  & STAT 452 Statistical Methods II
  STAT 457 Computer Data Analysis I
  & STAT 458 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
- 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) 2
BIOM 411  Exprmtl 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>M 162</td>
<td>Applied Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or M 171</td>
<td>Calculus I</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours  4

Minimum Required Grade: C-