# GENETICS AND GENOMICS, B.S.

## REQUIREMENTS

### UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements section of the Guide.

**General Education**

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

### COLLEGE OF AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

In addition to the University General Education Requirements, all undergraduate students in CALS must satisfy a set of college and major requirements. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies, Science, and Capstone), but courses counted toward university requirements may also be used to satisfy a college and/or a major requirement; similarly, courses counted toward college requirements may also be used to satisfy a university and/or a major requirement.

### COLLEGE REQUIREMENTS FOR ALL CALS B.S. DEGREE PROGRAMS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quality of Work: Students must maintain a minimum cumulative grade point average of 2.00 to remain in good standing and be eligible for graduation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.</td>
<td></td>
</tr>
</tbody>
</table>

### MAJOR REQUIREMENTS

#### Mathematics and Statistics

Complete one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry 1</td>
<td>5-10</td>
</tr>
<tr>
<td>MATH 171 &amp; MATH 217</td>
<td>Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Chemistry

Complete one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103 &amp; CHEM 104</td>
<td>General Chemistry I and General Chemistry II</td>
<td>5-9</td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 115 &amp; CHEM 116</td>
<td>Chemical Principles I and Chemical Principles II</td>
<td>3-6</td>
</tr>
</tbody>
</table>

Complete one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 341</td>
<td>Elementary Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 343 &amp; CHEM 345</td>
<td>Organic Chemistry I and Organic Chemistry II 1</td>
<td></td>
</tr>
</tbody>
</table>

#### Physics

Complete one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 103 &amp; PHYSICS 104</td>
<td>General Physics and General Physics (recommended)</td>
<td>10</td>
</tr>
<tr>
<td>PHYSICS 201 &amp; PHYSICS 202</td>
<td>General Physics and General Physics</td>
<td>10</td>
</tr>
<tr>
<td>PHYSICS 207 &amp; PHYSICS 208</td>
<td>General Physics and General Physics (recommended)</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Biology

Complete one of the following options:

**Option 1:**

First Year Seminar (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext) 1

International Studies (http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext) 3

Physical Science Fundamentals 4-5

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 103</td>
<td>General Chemistry I</td>
<td>5</td>
</tr>
<tr>
<td>or CHEM 108</td>
<td>Chemistry In Our World</td>
<td></td>
</tr>
<tr>
<td>or CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 341</td>
<td>Elementary Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 343 &amp; CHEM 345</td>
<td>Organic Chemistry I and Organic Chemistry II 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 103 &amp; PHYSICS 104</td>
<td>General Physics and General Physics (recommended)</td>
<td>10</td>
</tr>
<tr>
<td>PHYSICS 201 &amp; PHYSICS 202</td>
<td>General Physics and General Physics</td>
<td>10</td>
</tr>
<tr>
<td>PHYSICS 207 &amp; PHYSICS 208</td>
<td>General Physics and General Physics (recommended)</td>
<td>10</td>
</tr>
</tbody>
</table>
BIOLOGY/BOTANY/ZOOLOGY 151 & BIOLOGY/BOTANY/ZOOLOGY 152

Introductory Biology and Introductory Biology (recommended)

Option 2:

BOTANY/BIOLOGY 130

General Botany

ZOOLOGY/BIOLOGY 101 & ZOOLOGY/BIOLOGY 102

Animal Biology and Animal Biology Laboratory

Option 3:

BIOCORE 381 & BIOCORE 383

Evolution, Ecology, and Genetics and Cellular Biology

Select two of the following labs:

BIOCORE 382
Evolution, Ecology, and Genetics Laboratory

BIOCORE 384
Cellular Biology Laboratory

BIOCORE 486
Principles of Physiology Laboratory

Core Requirements

BIOCHEM 501 or BIOCHEM 507
Introduction to Biochemistry or General Biochemistry

Complete one of the following options:

Option 1:

GENETICS 467 & GENETICS 468
General Genetics 1 and General Genetics 2 (preferred)

Option 2:

GENETICS 466
Principles of Genetics (consult advisor 467 & 468 preferred)

additional 3 credit Genetics depth course (see course list below)

Select 2 credits from the following:

GENETICS 545
Genetics Laboratory

GENETICS 299
Independent Study

GENETICS 699
Special Problems

GENETICS 681
Senior Honors Thesis

GENETICS 682
Senior Honors Thesis

GENETICS 399
Coordinative Internship/Cooperative Education

Genetics Depth

See course list below

Genetics Breadth

See course list below

Capstone

Select one of the following:

Option 1:

GENETICS/BIOLOGY 522
Communicating Evolutionary Biology (Three-credit version only)

Option 2:

GENETICS 527
Developmental Genetics for Conservation and Regeneration (offered in fall semester)

Option 3:

GENETICS 566
Advanced Genetics (offered in spring semester)

Option 4:

GENETICS 564
Genomics and Proteomics (offered in spring semester)

Option 5 (must be taken concurrently):

GENETICS 699
Special Problems (offered in fall semester)

GENETICS 567
Companion Research Seminar (offered in fall semester)

Option 6 (must be taken concurrently):

GENETICS 681
Senior Honors Thesis

GENETICS 682
Senior Honors Thesis

GENETICS 567
Companion Research Seminar (offered in fall semester)

Total Credits

65-83

1
If CHEM 343 is taken, it must be taken as a part of CHEM 343 & CHEM 345, the latter of which counts as a Genetics Breadth requirement.

2
If BIOCHEM 507 is taken, it must be taken as a part of BIOCHEM 507 & BIOCHEM 508, the latter of which counts as a Genetics Breadth requirement.

3
Additional Depth course will not count toward the 9-credit Genetics Depth requirement.

4
Consult with your advisor if genetics-related research will be performed in a department other than Genetics.

5
May count for Genetics Depth or Capstone, but not both.

GENETICS DEPTH & BREADTH COURSES

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENETICS 520</td>
<td>Neurogenetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/BIOLOGY 522</td>
<td>Communicating Evolutionary Biology</td>
<td>2-3</td>
</tr>
<tr>
<td>GENETICS 525</td>
<td>Epigenetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 527</td>
<td>Developmental Genetics for Conservation and Regeneration</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 528</td>
<td>Banking Animal Biodiversity: International Field Study in Costa Rica</td>
<td>1</td>
</tr>
<tr>
<td>GENETICS 548</td>
<td>The Genomic Revolution</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/HORT 550</td>
<td>Molecular Approaches for Potential Crop Improvement</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 564</td>
<td>Genomics and Proteomics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS/BIOLOGY 565</td>
<td>Human Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 566</td>
<td>Advanced Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GENETICS 605</td>
<td>Clinical Cases in Medical Genetics</td>
<td>3</td>
</tr>
</tbody>
</table>
GENETICS/ BIOCHEM/ MICROBIO 612 Prokaryotic Molecular Biology 3

GENETICS/ BIOCHEM/ MD GENET 620 Eukaryotic Molecular Biology 3

GENETICS/ CHEM 626 Genomic Science 2

GENETICS 627 Animal Developmental Genetics 3

GENETICS/ BIOCHEM 631 Plant Genetics and Development 3

GENETICS 633 Population Genetics 3

GENETICS/ BOTANY/M M & I/ PL PATH 655 Biology and Genetics of Fungi 3

GENETICS/ MD GENET 662 Cancer Genetics 3

GENETICS/ MD GENET 677 Advanced Topics in Genetics 1-3

BREADTH

Physical Science:

BIOCHEM 508 General Biochemistry II 3-4

BIOCHEM 550 Principles of Human Disease and Biotechnology 2

CHEM 344 Introductory Organic Chemistry Laboratory 2

CHEM 345 Organic Chemistry II 3

Integrative Biology:

BIOCORE 485 Principles of Physiology 3

BIOCORE 587 Biological Interactions 3

BOTANY/ANTHRO/ ZOOLOGY 410 Evolutionary Biology 3

BOTANY 563 Phylogenetic Analysis of Molecular Data 3

MICROBIO 303 Biology of Microorganisms 3

MICROBIO 304 Biology of Microorganisms Laboratory 2

MICROBIO 470 Microbial Genetics & Molecular Machines 3

MICROBIO/ ONCOLOGY 545 Topics in Biotechnology 1

MICROBIO 632 Industrial Microbiology/Biotechnology 2

M M & I 341 Immunology 3

M M & I/PATH- BIO 528 Immunology 3

PL PATH 622 Plant-Bacterial Interactions 2-3

PL PATH/ ONCOLOGY 640 General Virology-Multiplication of Viruses 3

ZOOLOGY/ENVIR ST/ Extinction of Species 3

F&W ECOL 360

ZOOLOGY 425 Behavioral Ecology 3

ZOOLOGY 470 Introduction to Animal Development 3

ZOOGLOLOGY 555 Laboratory in Developmental Biology 3

ZOOGLOLOGY 570 Cell Biology 3

Agricultural Ecosystems:

AGRONGOMY/ HORT 338 Plant Breeding and Biotechnology 3

AGRONGOMY/ BOTANY/HORT 340 Plant Cell Culture and Genetic Engineering 3

AGRONGOMY/ HORT 501 Principles of Plant Breeding 3

AGRONGOMY/ HORT 502 Techniques of Plant Breeding 1

AN SCI/DY SCI 361 Introduction to Animal and Veterinary Genetics 2

AN SCI/DY SCI 362 Veterinary Genetics 2

AN SCI/DY SCI 363 Principles of Animal Breeding 2

HORT 500

PL PATH/BOTANY/ ENTOM 505 Plant-Microbe Interactions: Molecular and Ecological Aspects 3

Computational Biology:

B M I/COMP SCI 576 Introduction to Bioinformatics 3

UNIVERSITY DEGREE REQUIREMENTS

Total Degree To receive a bachelor’s degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.