MOLECULAR AND CELL BIOLOGY, BS

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 (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext) 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 LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF SCIENCE (BS)

Students pursuing a Bachelor of Science degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either the Bachelor of Arts or the Bachelor of Science degree requirements.

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Mathematics	Complete two courses of 3+ credits at the Intermediate or Advanced level in MATH, COMP SCI, or STAT subjects. A maximum of one course in each of COMP SCI and STAT subjects counts toward this requirement.
Language	Complete the third unit of a language other than English.
L&S Breadth	Complete: • 12 credits of Humanities, which must include at least 6 credits of Literature; and • 12 credits of Social Science; and • 12 credits of Natural Science, which must include 6 credits of Biological Science and 6 credits of Physical Science.
Liberal Arts and Science Coursework	Complete at least 108 credits.
Depth of Intermediate/Advanced Coursework	Complete at least 60 credits at the Intermediate or Advanced level.
Major	Declare and complete at least one major.
Total Credits	Complete at least 120 credits.
UW-Madison Experience	Complete both: • 30 credits in residence, overall, and • 30 credits in residence after the 86th credit.
Quality of Work	• 2.000 in all coursework at UW–Madison • 2.000 in Intermediate/Advanced level coursework at UW–Madison

NON–L&S STUDENTS PURSUING AN L&S MAJOR

Non–L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

REQUIREMENTS FOR THE MAJOR

MATHEMATICS, CHEMISTRY & PHYSICS

Code	Title	Credits
Mathematics and Statistics		**6-10**
Complete one of the following:		
MATH 221	Calculus and Analytic Geometry 1	5
MATH 217	Calculus with Algebra and Trigonometry II	5
Complete one of the following:		
MATH 222	Calculus and Analytic Geometry 2	4
MATH 213	Survey of Calculus 2	3
STAT 240	Data Science Modeling I	4
STAT 301	Introduction to Statistical Methods	3
STAT 371	Introductory Applied Statistics for the Life Sciences	3
General Chemistry–complete one option:		**5-10**
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	9
CHEM 109	Advanced General Chemistry	5
CHEM 115 & CHEM 116	Chemical Principles I and Chemical Principles II (by consent of instructor only)	10
Organic Chemistry -complete the sequence		**8**
CHEM 343	Organic Chemistry I	3
CHEM 344	Introductory Organic Chemistry Laboratory	2

CHEM 345	Organic Chemistry II	3
Physics -Choose a first and a second calculus based physics option OR elementary based physics sequence with additional calculus		**10-12**
Calculus Based Physics: First Introductory Course—complete one class:		
PHYSICS 207	General Physics	5
PHYSICS 201	General Physics	5
PHYSICS 247	A Modern Introduction to Physics	5
Calculus Based Physics: Second Introductory Course—complete one class:		
PHYSICS 208	General Physics	5
PHYSICS 202	General Physics	5
PHYSICS 248	A Modern Introduction to Physics	5
Elementary Based Physics --complete three		
PHYSICS 103	General Physics	4
PHYSICS 104	General Physics	4
MATH 234	Calculus--Functions of Several Variables	4

INTRODUCTORY BIOLOGY

Code	Title	Credits
Complete one option:		**10-13**
Option A:		
ZOOLOGY/ BIOLOGY/ BOTANY 151	Introductory Biology	5
ZOOLOGY/ BIOLOGY/ BOTANY 152	Introductory Biology	5
Option B: [1]		
BIOCORE 381	Evolution, Ecology, and Genetics	3
BIOCORE 382	Evolution, Ecology, and Genetics Laboratory	2
BIOCORE 383	Cellular Biology	3
BIOCORE 384	Cellular Biology Laboratory	2
BIOCORE 485	Principles of Physiology	3
Option C:		
ZOOLOGY/ BIOLOGY 101	Animal Biology	3
ZOOLOGY/ BIOLOGY 102	Animal Biology Laboratory	2
BOTANY/ BIOLOGY 130	General Botany	5

BREADTH COURSEWORK

Code	Title	Credits
Biochemistry -complete one of the following:		
BIOCHEM 501	Introduction to Biochemistry	3
BIOCHEM 507 & BIOCHEM 508	General Biochemistry I and General Biochemistry II	6
Cell Biology		
ZOOLOGY 570	Cell Biology	3
Molecular Biology and Genetics -complete one of the following:		
BIOCORE 381 & BIOCORE 383 & BIOCORE 587	Evolution, Ecology, and Genetics and Cellular Biology and Biological Interactions	9
GENETICS 466	Principles of Genetics	3
GENETICS 467 & GENETICS 468	General Genetics 1 and General Genetics 2	6
MICROBIO 470	Microbial Genetics & Molecular Machines	3
Total Credits		9-18

DEPTH COURSEWORK

Code	Title	Credits
Students must complete 6 unique credits of depth coursework. Courses may be concentrated in one area or distributed across multiple areas. [2]		
Biochemistry and Biophysics (no minimum)		
CHEM 575	Advanced Topics in Chemistry	1-4
BIOCHEM/ NUTR SCI 560	Principles of Human Disease and Biotechnology	2
BIOCHEM 601	Protein and Enzyme Structure and Function	2
BIOCHEM/ GENETICS/ MICROBIO 612	Prokaryotic Molecular Biology	3
BIOCHEM/ GENETICS/ MD GENET 620	Eukaryotic Molecular Biology	3
BIOCHEM/ BOTANY 621	Plant Biochemistry	3
BIOCHEM 625	Mechanisms of Action of Vitamins and Minerals	2
Cellular Systems (no minimum)		
ZOOLOGY 470	Introduction to Animal Development	3
ZOOLOGY/ PSYCH 523	Neurobiology	3
ZOOLOGY 603	Endocrinology	3-4
GENETICS 627	Animal Developmental Genetics	3
ONCOLOGY 401	Introduction to Experimental Oncology	2
PATH-BIO/ M M & I 528	Immunology	3
BIOCORE 587	Biological Interactions	3
NTP/ NEURODPT 610	Cellular and Molecular Neuroscience	4
Genetics (no minimum)		
AN SCI/DY SCI 361	Introduction to Animal and Veterinary Genetics	2
AGRONOMY/ HORT 338	Plant Breeding and Biotechnology	3
GENETICS 520	Neurogenetics	3
GENETICS/ HORT 550	Molecular Approaches for Potential Crop Improvement	3
GENETICS/ MD GENET 565	Human Genetics	3
HORT/AGRONOMY/ BOTANY 340	Plant Cell Culture and Genetic Engineering	3

MICROBIO 607		3
GENETICS/ BIOCHEM/ MICROBIO 612	Prokaryotic Molecular Biology	3
GENETICS/ BIOCHEM/ MD GENET 620	Eukaryotic Molecular Biology	3
GENETICS 627	Animal Developmental Genetics	3
GENETICS/ BIOCHEM 631	Plant Genetics and Development	3
GENETICS/ MD GENET 662	Cancer Genetics	3
Microbiology and Virology (no minimum)		
MICROBIO 303	Biology of Microorganisms	3
MICROBIO/AN SCI/ BOTANY 335	The Microbiome of Plants, Animals, and Humans	3
MICROBIO/ SOIL SCI 425	Environmental Microbiology	3
MICROBIO/ SOIL SCI 523	Soil Microbiology and Biochemistry	3
MICROBIO 526	Physiology of Microorganisms	3
PL PATH 622	Plant-Bacterial Interactions	2-3
BOTANY/ENTOM/ PL PATH 505	Plant-Microbe Interactions: Molecular and Ecological Aspects	3
BIOCHEM/ M M & I 575	Biology of Viruses	2
ONCOLOGY/ M M & I/ PL PATH 640	General Virology-Multiplication of Viruses	3
Quantitative Biology (no minimum)		
MATH/ COMP SCI 240	Introduction to Discrete Mathematics	3
MATH 340	Elementary Matrix and Linear Algebra	3
STAT 303	R for Statistics I	1
STAT 304	R for Statistics II	1
STAT 305	R for Statistics III	1
STAT 333	Applied Regression Analysis	3
STAT 421	Applied Categorical Data Analysis	3
B M E 556	Systems Biology: Mammalian Signaling Networks	3
COMP SCI 300	Programming II	3
COMP SCI 368	Learning a Programming Language	1
COMP SCI 540	Introduction to Artificial Intelligence	3
COMP SCI/ B M I 567	Medical Image Analysis	3
COMP SCI/ B M I 576	Introduction to Bioinformatics	3
MICROBIO 657	Bioinformatics for Microbiologists	3

LABORATORY COURSE

Complete 2 credits minimum:

Code	Title	Credits
Students who complete at least 4 credits of MOL BIOL 699 fulfill both the Laboratory Course and Directed/Independent Study requirements		
CHEM 327	Fundamentals of Analytical Science	4
CHEM 329	Fundamentals of Analytical Science	4
COMP SCI 220	Data Science Programming I	4
MICROBIO 304	Biology of Microorganisms Laboratory	2
MICROBIO 657	Bioinformatics for Microbiologists	3
MOL BIOL 681	Senior Honors Thesis	3
MOL BIOL 691	Senior Thesis	3
MOL BIOL 699	Directed Studies in Molecular Biology	1-4
ZOOLOGY 555	Laboratory in Developmental Biology	3

DIRECTED/INDEPENDENT STUDY

Code	Title	Credits
Students who complete at least 4 credits of MOL BIOL 699 fulfill both the Laboratory Course and Directed/Independent Study requirements		
Complete two credits minimum:		
Directed/Independent Research		
MOL BIOL 699	Directed Studies in Molecular Biology	1-4
Senior Thesis		
MOL BIOL 682	Senior Honors Thesis	3
MOL BIOL 692	Senior Thesis	3

RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in all MOL BIOL and major courses
- 2.000 GPA on at least 15 credits of upper-level in the major, taken in residence[3]
- 15 credits in MOL BIOL, taken on the UW–Madison campus

HONORS IN THE MAJOR

Students may declare Honors in the Molecular Biology and Cell Biology major in consultation with the Molecular and Cell Biology undergraduate advisor.

HONORS IN THE MOLECULAR AND CELL BIOLOGY MAJOR REQUIREMENTS

To earn Honors in the Major in Molecular and Cell Biology, students must satisfy both the requirements for the major (above) and the following additional requirements:

- Earn a 3.300 overall university GPA
- Earn a 3.300 GPA for all courses accepted in the major
- Complete at least 15 credits of honors courses in the major while in residence at UW-Madison. This requirement can be broken down as indicated below:
  - At least 9 credits from the Breadth and Depth course options in the Molecular and Cell Biology major

- Complete two semester Senior Honors Thesis, a piece of original research composition.

Code	Title	Credits
MOL BIOL 681	Senior Honors Thesis	3
MOL BIOL 682	Senior Honors Thesis	3

- Complete one semester of the Molecular Biology senior honors seminar course.

Code	Title	Credits
MOL BIOL 686	Senior Honors Seminar in Molecular Biology	1

FOOTNOTES

[1] BIOCORE is a competitive honors program and certificate.
[2] Students are encouraged to see their advisor for assistance in choosing depth coursework.
[3] Courses accepted in the major that are Intermediate or Advanced are considered upper-level in this major.

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.