

# Cellular and Molecular

Specializing your Biology degree at Iowa State University

Have Questions About the Biology Major?  
Contact us at 515-294-1064 or [biology@iastate.edu](mailto:biology@iastate.edu)  
Or visit Student Services in 103 Bessey Hall

Cellular and molecular biologists study the structure, function, and interactions of the molecules within living cells. Encompassing fields such as biochemistry, genetics, developmental biology, histology, microbiology, pathology, and physiology, this specialization underpins all biological sciences. Cellular and molecular biology addresses questions such as: how do cells replicate themselves and grow? How do cells acquire their specialized function? When these processes go awry, what abnormalities or diseases result? Focusing on cellular and molecular biology prepares students for careers in biotechnology, human medicine, regulation (whether food, drug, or environmental), veterinary medicine, and more.

Students interested in this specialization should prioritize completing genetics (BIOL 313 & lab), and molecular cell biology (BIOL 314) within the biology core curriculum. For advanced biology coursework, we recommend taking at least 9 credits from the list below. Participating in experiential learning, such as an independent study course (BIOL 490), related internship experience (BIOL 494), and especially lab/field research (BIOL 499) is also advised. Many students specializing in this area pursue further education with a Masters or Ph.D.

## Suggested Advanced Biology Courses for Molecular/Cellular Students

Course #	Course Name	Credits
AN S 345	Growth/Dev't Domestic Anim.	3
AN S 352	Genetic Improv't Domest. Anim.	3
BBMB 405	Biochemistry II	3
BBMB 411	Techniques in Biochem Rsch.	4
BBMB 420	Mammalian Biochemistry	3
B M S 335	Molec/Cell Basis of Disease	1
BIOL 322	Intro Bioinformatics	3
BIOL 328	Molec/Cell of Human Disease	3
BIOL 349	Genome Perspective in Biology	3
BIOL 352	Vertebrate Histology	4
BIOL 402	Introduction to Pathology	3
BIOL 420X	Plant Molecular Biology	3
BIOL 423	Developmental Biology	3
BIOL 423L	Developmental Biology Lab	1
BIOL 428	Topics in Cell Biology	3
BIOL 434	Endocrinology	3
BIOL 436	Neurobiology	3
BIOL 444	Bioinformatic Analysis	3

Course #	Course Name	Credits
GDCB 510	Transmission Genetics	3
GDCB 511	Advanced Molecular Genetics	3
GDCB 528	Advances in Molec/Cell Bio	3
GDCB 533	Advances in Developmental Bio	3
GDCB 542	Intro to Molec. Bio Techniques	1
GDCB 545	Plant Molec/Cell/Dev't Biology	3
GDCB 556	Cell/Molec/Dev't Neuroscience	3
GDCB 557	Advanced Neuroscience Tech.	3
GEN 340	Human Genetics	3
GEN 409	Molecular Genetics	3
GEN 410	Analytical Genetics	3
MICRO 302	Biology of Microorganisms	3
MICRO 302L	Microbiology Lab	1
MICRO 310	Medical Microbiology	3
MICRO 310L	Medical Microbiology Lab	1
MICRO 320	Molec. and Cellular Bacteriology	4
MICRO 402	Microbial Genetics	3
MICRO 408	Virology	3
MICRO 475	Immunology	3

## Suggested Supporting Science Courses

Having a more comprehensive understanding of chemistry is important for specializing in cellular and molecular biology, so students should plan to take a full year of general chemistry (CHEM 177 + CHEM 177L, and CHEM 178 + CHEM 178L), a full year of organic chemistry (CHEM 331 + CHEM 331L, and CHEM 332 + CHEM 332L), and strongly consider taking more advanced biochemistry courses (i.e., BBMB 420, or BBMB 404 and BBMB 405). Calculus is also used more frequently in this specialization, so students are encouraged to take at least one semester of calculus, if not a full-year of the discipline. Similarly, a full-year of physics (PHYS 111 and PHYS 112 or PHYS 221 and PHYS 222) is suggested. Bioinformatics (<https://bcbio.las.iastate.edu>) complements this specialization, and students may want to consider a minor in this area.

## Resources for Molecular/Cellular Students

American Society for Biochemistry and Molecular Biology: <http://www.asbmb.org>

American Society for Cell Biology: <http://www.ascb.org>

American Society for Microbiology: <https://www.asm.org>

National Biotechnology Education Center: <https://www.bio-link.org/students>

Genetics Society of America: <http://genetics-gsa.org>

Society for Neuroscience: <http://www.sfn.org>

GRE Information: <http://www.ets.org/gre/>

Be sure to check for student organizations too at: <https://www.stuorg.iastate.edu>