

## Cell Biology Major, B.S.

Department of Biology

Cell biology is one of the most rapidly growing areas of modern biology. This major prepares students for graduate school and careers in cell biology, genetics, developmental biology, physiology, immunology, and biotechnology. The major is also appropriate for students considering professional schools of medicine, dentistry, pharmacy, and veterinary medicine.

### Typical Program of Study:

#### Fall Semester

##### First Year

Biol 1011 General Biology I<sup>a</sup> 5 cr  
Chem 1151 General Chemistry I<sup>a</sup>  
or Chem 1161 Honors Chemistry I<sup>a</sup> 5 cr  
Comp 1120 College Writing 3 cr  
13 cr

##### Second Year

Chem 2521 Organic Chemistry I 4 cr  
Stat 2411 Statistical Methods  
or 3611 Intro to Probability and Statistics 3-4 cr  
Phys 2011 General Physics I<sup>c</sup>  
or Phys 1001 Introduction to Physics I 4-5 cr  
Liberal education or minor field course 3 cr  
14-16 cr

##### Third Year

Biol 2201 Genetics 3 cr  
Biol 3997 Seminar I 0.5 cr  
Biol 4501 General Microbiology 4 cr  
Biology elective<sup>e</sup>, liberal education, or minor course 7-9 cr  
14.5 -16.5 cr

##### Fourth Year

Biol 3703 Animal Physiology 3 cr  
Biol 4361 Developmental Biology 3 cr  
Biology elective<sup>e</sup>, liberal education, or minor course 6-8 cr  
12-14 cr

#### Spring Semester

Biol 1012 General Biology II 5 cr  
Chem 1152 General Chemistry II  
or Chem 1162 Honors Chemistry II 5 cr  
Math 1290 Calculus for the Natural Sciences<sup>b</sup>  
or Math 1296 Calculus I<sup>b</sup> 5 cr  
15 cr  
  
Biol 2101 Cell Biology 3 cr  
Biol 2102 Cell Biology Lab 2 cr  
Chem 2522 Organic Chemistry II 4-5 cr  
Phys 2012 General Physics II  
or Phys 1002 Intro to Physics II 4-5 cr  
13-15 cr  
  
Biol 3998 Seminar II 0.5 cr  
Biol 4801 Evolution 2 cr  
Chem 3322 Biochemistry<sup>d</sup> 3 cr  
Chem 3324 Biochemistry Lab<sup>d</sup> 1 cr  
Comp 3150 Advanced Writing: Science 3 cr  
Biology elective<sup>e</sup>, liberal education, or minor course 3-5 cr  
13.5-15.5 cr  
  
Biol 4231 Molecular Genetics 3 cr  
Biol 4232 Molecular Biology Lab 2 cr  
Biol 5233 Genomics 3 cr  
Biology elective<sup>e</sup>, liberal education, or minor course 7-9 cr  
15-17 cr

<sup>a</sup> High school chemistry or Chem 1113 Intro to General Chemistry is required before Biol 1011 and Chem 1151 or Chem 1161.

<sup>b</sup> First math course is determined by math placement exam; this schedule presupposes placement into Math 1290/1296.

<sup>c</sup> Phys 2011-2012 is a calculus-based physics series requiring completion of Math 1297 Calculus II. Math 1297 is required by some graduate and professional schools.

<sup>d</sup> Or Chem 4341 Biochemistry (4 cr.) and Chem 4363 Biochemistry Laboratory (2 cr.) offered during fall semester.

<sup>e</sup> Majors must take an additional minimum of 6 credits, with at least one course with lab or a lab course (denoted by L) from the following: Biol 2801, 3990, 3994, 4199, 5240 (L), 5365 (L), 5511 (L), 5513 (L), 5760 (L), 5772, 5801, 5802 (L), 5990, MdBC 5501, MicB 5545, 5555, Phsl 5601, Phsl 5602 (L).

For further information:

Department of Biology  
207 James I. Swenson Science Building  
Duluth, MN 55812-2496  
218-726-6262  
biol@d.umn.edu  
<http://www.d.umn.edu/biology>

## Cell Biology Major, B.S.

MAJOR COURSE REQUIREMENTS	CREDITS	PREREQUISITES	SEMESTER TO BE COMPLETED	GRADE
<b>YEAR 1</b>				
Biol 1011 General Biology I ^	5	1 yr. of high school or college chemistry		
Biol 1012 General Biology II	5	Biol 1011		
Chem 1151 General Chemistry I ^	5	1 year high school chemistry; high school algebra Chem 1151		
<b>and</b> Chem 1152 General Chemistry II	5			
<b>OR</b>				
Chem 1161 Honors General Chemistry ^	5	High school chemistry; placement Chem 1161		
<b>and</b> Chem 1162 Honors General Chemistry II	5			
Math 1290 Calculus for the Natural Sciences	5	Math placement or Math 1250 with grade of 'C-' or better		
<b>OR</b>				
Math 1296 Calculus I	5	Math placement or Math 1250 with grade of 'C-' or better		
Comp 1120 College Writing	3			
<b>YEAR 2</b>				
Biol 2101 Cell Biology	3	Biol 1012; 4 credits of organic chemistry Biol 2101 (concurrent registration OK)		
Biol 2102 Cell Biology lab	2			
Chem 2251 Organic Chemistry I and Chem 2522 Organic Chemistry II	4 4	Chem 1152 or Chem 1162 Chem 2521		
Phys 1001 Intro to Physics I	5	Algebra, Trigonometry Phys 1001		
<b>and</b> Phys 1002 Intro to Physics II	5			
<b>OR</b>				
Phys 2011 General Physics I +	4	Math 1290 or Math 1296 Phys 2011; Math 1297		
<b>and</b> Phys 2012 General Physics II +	4			
Stat 2411 Statistical Methods	3	Math placement or Math 1250		
<b>OR</b>				
Stat 3611 Intro to Probability & Statistics	4	Math 1290 or Math 1296		
<b>YEAR 3</b>				
Biol 2201 Genetics	3	Biol 1012; Math 1005 or higher Junior or instructor consent Junior or Senior or instructor consent Biol 2101 or instructor consent Biol 1012, Biol 2201 or instructor consent		
Biol 3997 Seminar I	0.5			
Biol 3998 Seminar II	0.5			
Biol 4501 General Microbiology	4			
Biol 4801 Evolution	2			
Biol electives*	3			
Chem 3322 Biochemistry #	3	Chem 2522 Concurrent registration in Chem 3322		
Chem 3324 Biochemistry lab	1			
Comp 3150 Advanced Writing: Science	3	Comp 1120; 60 credits		
<b>YEAR 4</b>				
Biol 3703 Animal Physiology	3	Biol 1012; one semester college chemistry Biol 2101, Biol 2201 or instructor consent Concurrent reg. in Biol 4231 or instructor consent Biol 2101, Biol 2201 or instructor consent Biol 1012, Biol 2201, and Biol 2101 or a course in biochemistry or molecular biology or instructor consent		
Biol 4231 Molecular Genetics	3			
Biol 4232 Molecular Biology lab	2			
Biol 4361 Developmental Biology	3			
Biol 5233 Genomics	3			
Biol electives*	3			

^ High school chemistry or Chem 1113 Intro to General Chemistry is required before Biol 1011 and Chem 1151 or Chem 1161.

+ Phys 2011-2012 is a calculus-based physics series requiring completion of Math 1297 Calculus II. Math 1297 is required by some graduate and professional schools.

# Or Chem 4341 Biochemistry (4 cr.) and Chem 4363 Biochemistry Laboratory (2 cr.) offered during fall semester.

\*Students must take a minimum of 6 biology elective credits, at least one course with a lab or a lab course (denoted by L) from the following list of courses:

Biol 2801, Biol 3990, Biol 3994, Biol 4199, Biol 5240 (L), Biol 5365 (L), Biol 5511 (L), Biol 5513 (L), Biol 5760 (L), Biol 5772, Biol 5801, Biol 5802 (L), Biol 5990, MdBC 5501, MicB 5545, MicB 5555, Phsl 5601, Phsl 5602 (L).

NOTE: In addition to the above requirements, students must complete a minor and the liberal education program to earn a B.S. degree. Students may not seek a minor or second major in Biology.