

MAJOR: BIOCHEMISTRY AND MOLECULAR BIOLOGY, B.S.

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

Biochemistry and molecular biology is the study of life at the molecular level. This field is both a life science and a chemical science, exploring the chemistry of living organisms and the molecular basis for the processes that occur in living cells. The Department of Chemistry and Biochemistry provides classroom and laboratory learning opportunities and research experiences across the discipline to meet the needs of students in engineering, liberal arts, and preprofessional programs as well as those of students who wish to pursue careers or graduate studies in chemistry or related disciplines.

TYPICAL PROGRAM OF STUDY			
FIRST YEAR			
FALL SEMESTER		SPRING SEMESTER	
BIOL 1011 General Biology I	5 cr	BIOL 1012 General Biology II	5 cr
CHEM 1151 General Chemistry I or CHEM 1161 Honors General Chemistry I	5 cr	CHEM 1152 General Chemistry II or CHEM 1162 Honors General Chemistry II	5 cr
MATH 1296 Calculus I ¹	5 cr	MATH 1297 Calculus II ¹	5 cr
Total: 15 cr		Total: 15 cr	
SECOND YEAR			
CHEM 2222 Quantitative Analysis ²	3 cr	BIOL 2101 Cell Biology	3 cr
CHEM 2223 Quantitative Analysis lab ²	1 cr	CHEM 2542 Organic Chemistry II	3 cr
CHEM 2541 Organic Chemistry I	3 cr	CHEM 2544 Organic Chemistry II lab	1 cr
CHEM 2543 Organic Chemistry I lab	1 cr	PHYS 2012 General Physics II	4 cr
PHYS 2011 General Physics I	4 cr	Liberal Education Course or Minor Field Course	<u>4 cr</u>
WRIT 1120 College Writing	<u>3 cr</u>		Total: 15 cr
Total: 15 cr			
THIRD YEAR			
BIOL 2201 Genetics	3 cr	BIOL 4231 Molecular Biology	3 cr
CHEM 4351 Biochemistry I	3 cr	BIOL 5232 Molecular Biology lab	2 cr
CHEM 4363 Biochemistry Lab	2 cr	CHEM 4352 Biochemistry II	3 cr
CHEM 4634 Physical Chemistry	3 cr	WRIT 3xxx Advanced Composition	3 cr
CHEM 4633 Physical Chemistry Lab	1 cr	Liberal Education Course or Minor Field Course	<u>3 cr</u>
Liberal Education Course or Minor Field Course	<u>3 cr</u>		Total: 14 cr
Total: 16 cr			
FOURTH YEAR			
CHEM 4184 Undergraduate Seminar I	1 cr	CHEM 4185 Undergraduate Seminar II	1 cr
CHEM 4373 Physical Biochemistry	3 cr	CHEM 3432 Descriptive Inorganic Chemistry	2 cr
Liberal Education Course or Minor Field Course	<u>10 cr</u>	Chemistry major elective ³	3 cr
Total: 15 cr		Liberal Education Course or Minor Field Course	<u>9 cr</u>
		Total: 15 cr	

¹First math course is determined by math placement exam. This schedule presupposes placement into MATH 1296.

¹Math 1596 Honors Calculus I and MATH 1597 Honors Calculus II may be substituted for MATH 1296 and 1297.

²Chem 2242 Analytical Chemistry Applied to Environmental Problems in Eastern Europe (4 cr) may be substituted for CHEM 2222 Quantitative Analysis (3 cr) and CHEM 2223 Quantitative Analysis Lab (1 cr)

³Approved chemistry major electives include: CHEM 4242, CHEM 4436, BIOL 4501, BIOL 5233, IBS 5101, MATH 5233, MDBC 5201, MDBC 5202, MICB 5545

FOR ADDITIONAL INFORMATION:

Department of Chemistry and Biochemistry
Chemistry 246
726-7212 or 726-8163
chem@d.umn.edu
<http://www.d.umn.edu/chemistry>

BIOCHEMISTRY AND MOLECULAR BIOLOGY, B.S.

MAJOR REQUIREMENTS	CREDITS	PREREQUISITES	SEMESTER TO BE COMPLETED	GRADE
YEAR 1				
BIOL 1011 General Biology I	5	1 yr of high school or 1 semester of college chemistry BIOL 1011		
BIOL 1012 General biology II	5			
CHEM 1151 General Chemistry I and CHEM 1152 General Chemistry II	5 5	1 year HS chemistry; HS algebra CHEM 1151		
OR				
CHEM 1161 Honors Chemistry I and CHEM 1162 Honors Chemistry II	5 5	1 year HS chemistry; placement CHEM 1161		
MATH 1296 Calculus I ¹	5	Math placement or MATH 1250 with a 'C-' or better MATH 1296 or 1596 with a 'C-' or better		
MATH 1297 Calculus II ¹	5			
YEAR 2				
BIOL 2101 Cell Biology	3	BIOL 1012; CHEM 1152, 2541		
WRIT 1120 College Writing	3			
CHEM 2222 Quantitative Analysis ²	3	CHEM 1152 or 1162		
CHEM 2223 Quantitative Analysis lab ²	1	Concurrent registration in CHEM 2222		
CHEM 2541 Organic Chemistry I	3	CHEM 1152 or 1162		
CHEM 2543 Organic Chemistry I lab	1	CHEM 1152 or 1162 and concurrent reg. in CHEM 2541		
CHEM 2542 Organic Chemistry II	3	CHEM 2541 (or CHEM 2521)		
CHEM 2544 Organic Chemistry II lab	1	CHEM 2541/43 or 2521; concurrent reg. in CHEM 2542		
Phys 2011 General Physics I	4	MATH 1290 or MATH 1296		
Phys 2012 General Physics II	4	Phys 2011; MATH 1297		
YEAR 3				
BIOL 2201 Genetics	3	BIOL 1012		
BIOL 4231 Molecular Biology	3	BIOL 2101 and 2201		
BIOL 5232 Molecular Biology lab	2	Concurrent registration with BIOL 4231		
CHEM 4363 Biochemistry lab	2	CHEM 2223 & 2522 or 2542/44; concurrent CHEM 4351		
CHEM 4351 Biochemistry I	3	CHEM 2222 & 2522 or 2542/44; concurrent CHEM 4363		
CHEM 4352 Biochemistry II	3	CHEM 4351		
CHEM 4634 Physical Chemistry	3	2 yrs chemistry; (PHYS 1002 or 2012), MATH 1297 and (CHEM 2222 or 2212 or 2242)		
CHEM 4633 Physical Chemistry laboratory	1	Concurrent registration in CHEM 4632		
WRIT 31xx Advanced Writing	3	WRIT 1120; 60 credits		
YEAR 4				
CHEM 4184 Undergraduate Seminar I	1	BS Chem or BMB major; min 90 credit		
CHEM 4185 Undergraduate Seminar II	1	CHEM 4184		
CHEM 4242 Instrumental Analysis	3	CHEM 2222 and 4632 or 4642		
CHEM 3432 Inorganic Chemistry	2	CHEM (2222 & 2223) or 2242 and 2542 and (2544 or 2545)		
CHEM 4373 Physical Biochemistry	3	CHEM (4632 or 4634 or 4641) and (4351 or 3322)		
Chemistry major elective ³	3			

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³Approved chemistry major elective courses include: CHEM 4242, CHEM 4436, BIOL 4501, BIOL 5233, IBS 5101, MATH 5233, MDBC 5201, MDBC 5202, MICB 5545.

NOTE: In addition to the above requirements, students must complete the liberal education program and a minor (or a second major) to earn a B.S. degree. Biochemistry and Molecular biology majors may not pursue a BA in Chemistry or chemistry minor to meet this requirement.