

BIOCHEMISTRY, B.SC. HONOURS

Degree Requirements

Honours

Course	Title	Hours
Year 1		
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties (B)	3
CHEM 1120	Introduction to Chemistry Techniques (C+) ¹	3
BIOL 1020	Biology 1: Principles and Themes (C+)	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions	3
PHYS 1050 or PHYS 1020	Physics 1: Mechanics or General Physics 1	3
MATH 1500	Introduction to Calculus ²	3
STAT 1150 or STAT 1000	Introduction to Statistics and Computing or Basic Statistical Analysis 1	3
Hours		24

Years 1-2

In Year 1 or Year 2 the following must be completed:		
6 credit hours from the Faculty of Arts including the University Written English "W" requirement ³		6
Hours		6

Year 2

CHEM 2100	Organic Chemistry 1: Foundations of Organic Chemistry	3
CHEM 2110	Organic Chemistry 2: Foundations of Organic Synthesis	3
CHEM 2122	Experimental Organic Chemistry	3
CHEM 2510	Introduction to Analytical Chemistry	3
CHEM 2520	Introduction to Analytical Chemistry Techniques	2
CHEM 2700	Biochemistry 1: Biomolecules and an Introduction to Metabolic Energy	3
CHEM 2710	Biochemistry 2: Catabolism, Synthesis, and Information Pathways	3
CHEM 2720	Principles and Practices of the Modern Biochemistry Laboratory	3
MBIO 1010	Microbiology I ⁴	3
MBIO 2020	Microbiology II	3
Hours		29

Year 3

BIOL 2520	Cell Biology	3
CHEM 3700	Biophysical Chemistry	3
CHEM 3760	Advanced Methods for the Biochemistry Laboratory	4
MBIO 3410	Molecular Biology	3
Hours		13

Years 3-4

9 credit hours from:		9
MBIO 3450	Regulation of Biochemical Processes	
MBIO 3460	Membrane and Cellular Biochemistry	
CHEM 4360	Signalling and Regulation of Gene Expression	
CHEM 4620	Biochemistry of Nucleic Acids	
MBIO 4540	Biological Energy Transduction	
MBIO 4612	Molecular Genetics of Eukaryotes - Lectures	
18 credit hours from the list of Chemistry and Microbiology optional courses listed below. Of these 18 credit hours, at least 6 hours must be 4000 level courses.		18
12 credit hours selected from the Faculty of Science ⁵		12
Hours		39
Year 4		
CHEM 4630	Biochemistry of Proteins	3
CHEM 4710 or MBIO 4530	Research Project in Chemistry or Biochemistry or Project in Microbiology	6
Hours		9
Total Hours		120

¹ CHEM 1126 may be used in lieu of CHEM 1120.

² MATH 1230 or MATH 1510 or MATH 1520 or MATH 1690 may be taken in place of MATH 1500.

³ As there are no electives in Year 2 of the program, students should complete the university written English requirement in Year 1. If not completed in Year 1, a "W" course must be completed prior to Year 3 in addition to the required Year 2 courses.

⁴ MBIO 1010 can be taken in Year 1 after BIOL 1020.

⁵ MATH 1010, MATH 1020, the former MATH 1190, the former COMP 1260, the former COMP 1270, COMP 1500 and COMP 1600 may not be chosen to satisfy this requirement.

(Letters in brackets indicate minimum prerequisite standing for further study.)

Honours Co-operative Option

Important Note¹

Course	Title	Hours
Year 1		
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties (B)	3
CHEM 1120	Introduction to Chemistry Techniques (C+) ²	3
BIOL 1020	Biology 1: Principles and Themes (C+)	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions	3
PHYS 1050 or PHYS 1020	Physics 1: Mechanics or General Physics 1	3
MATH 1500	Introduction to Calculus ³	3

STAT 1150 or STAT 1000	Introduction to Statistics and Computing or Basic Statistical Analysis 1	3
Hours		24

Years 1-2

In Year 1 or Year 2 the following must be completed:		
6 credit hours from the Faculty of Arts including the University Written English "W" requirement ⁴		6
Hours		6

Year 2

CHEM 2100	Organic Chemistry 1: Foundations of Organic Chemistry	3
CHEM 2110	Organic Chemistry 2: Foundations of Organic Synthesis	3
CHEM 2122	Experimental Organic Chemistry	3
CHEM 2510	Introduction to Analytical Chemistry	3
CHEM 2520	Introduction to Analytical Chemistry Techniques	2
CHEM 2700	Biochemistry 1: Biomolecules and an Introduction to Metabolic Energy	3
CHEM 2710	Biochemistry 2: Catabolism, Synthesis, and Information Pathways	3
CHEM 2720	Principles and Practices of the Modern Biochemistry Laboratory	3
MBIO 1010	Microbiology I ⁵	3
MBIO 2020	Microbiology II	3
Hours		29

Year 3

BIOL 2520	Cell Biology	3
CHEM 3700	Biophysical Chemistry	3
CHEM 3760	Advanced Methods for the Biochemistry Laboratory	4
MBIO 3410	Molecular Biology	3
Hours		13

Years 3-4

9 credit hours from:		9
MBIO 3450	Regulation of Biochemical Processes	
MBIO 3460	Membrane and Cellular Biochemistry	
CHEM 4360	Signalling and Regulation of Gene Expression	
CHEM 4620	Biochemistry of Nucleic Acids	
MBIO 4540	Biological Energy Transduction	
MBIO 4612	Molecular Genetics of Eukaryotes - Lectures	
24 credit hours selected from the list of Chemistry and Microbiology optional courses listed below. Of these 24 credit hours, at least 12 hours must be 4000 level courses.		24
12 credit hours selected from the Faculty of Science ⁶		12
Co-op Requirements:		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
SCI 4980	Co-operative Education Work Term 3	0
SCI 4990	Co-operative Education Work Term 4 (if a 4th work term is selected)	0
Hours		45

Year 4

CHEM 4630	Biochemistry of Proteins	3
Hours		3
Total Hours		120

- Students in the co-operative program must ensure that they are able to satisfy the prerequisites for all 3000 and 4000 level courses they plan to take.
- CHEM 1126 may be used in lieu of CHEM 1120.
- MATH 1230 or MATH 1510 or MATH 1520 or MATH 1690 may be taken in place of MATH 1500.
- As there are no electives in Year 2 of the program, students should complete the university written English requirement in Year 1. If not completed in Year 1, a "W" course must be completed prior to Year 3 in addition to the required Year 2 courses.
- MBIO 1010 can be taken in Year 1 after BIOL 1020.
- MATH 1010, MATH 1020, the former MATH 1190, the former COMP 1260, the former COMP 1270, COMP 1500 and COMP 1600 may not be chosen to satisfy this requirement.

(Letters in brackets indicate minimum prerequisite standing for further study.)

Chemistry and Microbiology Optional Courses for Biochemistry Honours Students

Course	Title	Hours
Chemistry		
CHEM 2300	Inorganic Chemistry 1: Structure and Applications	3
CHEM 2600	Physical Chemistry 1	3
CHEM 3100	Organic Chemistry 3: Advanced Organic Synthesis	3
CHEM 3120	Advanced Organic Chemistry Laboratory Techniques	2
CHEM 3300	Inorganic Chemistry 2: Reactivity and Properties	3
CHEM 3320	Inorganic Chemistry Laboratory	2
CHEM 3500	Instrumental Analysis	3
CHEM 3520	Instrumental Analysis Laboratory	2
CHEM 3600	Physical Chemistry 2	3
CHEM 3620	Physical Chemistry Laboratory	2
CHEM 3820	Integrated Chemistry Laboratory 1	2
CHEM 3840	Integrated Chemistry Laboratory 2	3
CHEM 4100	Materials Chemistry	3
CHEM 4110	Introduction to Computational Chemistry	3
CHEM 4130	Elementary Quantum Chemistry and Molecular Bonding	3
CHEM 4150	Symmetry, Spectroscopy, and Structure	3
CHEM 4170	Introduction to Polymer Chemistry	3
CHEM 4360	Signalling and Regulation of Gene Expression	3
CHEM 4370	Glycobiology and Protein Activation	3
CHEM 4570	Topics in Inorganic Chemistry	3
CHEM 4580	Topics in Organic Chemistry	3
CHEM 4590	Bioanalytical Methods	3
CHEM 4610	Advanced Chemical Techniques	6
CHEM 4620	Biochemistry of Nucleic Acids	3
CHEM 4670	Drug Design and Drug Discovery	3
CHEM 4680	Organometallic Chemistry	3

CHEM 4800	Topics in Physical/Theoretical Chemistry	3
CHEM 4802	Topics in Analytical Chemistry	3
CHEM 4804	Topics in Biochemistry	3
Microbiology		
MBIO 3000	Applied Biological Safety	3
MBIO 3010	Mechanisms of Microbial Disease	3
MBIO 3032	Microbiology III: Physiology and Metabolism	3
MBIO 3282	Microbial Communities	3
MBIO 3430	Molecular Evolution	3
MBIO 3450	Regulation of Biochemical Processes	3
MBIO 3460	Membrane and Cellular Biochemistry	3
MBIO 3472	Microbial Systematics	3
MBIO 3600	Molecular Microbiology Techniques	3
MBIO 3700	Experimental Microbiology Laboratory	3
MBIO 4020	Immunology	3
MBIO 4030	Special Topics in Microbiology	3
MBIO 4032	Special Topics in Microbiology	3
MBIO 4410	Virology	3
MBIO 4440	Course no longer offered	
MBIO 4480	Microbes in our Environment	3
MBIO 4520	Industrial Bioprocesses	3
MBIO 4540	Biological Energy Transduction	3
MBIO 4602	Molecular Genetics of Prokaryotes - Lectures	3
MBIO 4612	Molecular Genetics of Eukaryotes - Lectures	3
MBIO 4672	Applied Molecular Biology	3

Optional courses no longer offered that may be used if taken prior to their deletion: CHEM 2260, CHEM 2290, CHEM 2400, CHEM 2470, CHEM 3260, CHEM 3360, CHEM 3370, CHEM 3380, CHEM 3390, CHEM 3400, CHEM 3490, CHEM 3580, CHEM 3590, CHEM 4600, CHEM 4640, CHEM 4650, CHEM 4690, MBIO 2280, MBIO 3030, MBIO 3280, MBIO 3440, MBIO 3470, MBIO 3480, MBIO 4010, MBIO 4320, MBIO 4470, MBIO 4510, MBIO 4570, MBIO 4580, MBIO 4600, MBIO 4610, and MBIO 4670. **Note:** Several of these courses may not be held with current course offerings found on the above optional course lists. Please refer to the course descriptions for more information about specific course restrictions.