BIOLOGICAL SCIENCES, B.SC. HONOURS

Biological Sciences Honours Entrance, Continuation, and Graduation Requirements

The Honours program is designed for students planning a professional career in Biological Sciences at the graduate level. Such students are strongly advised to enter the Honours program at the beginning of second year.

Appropriate courses will be arranged in consultation with the Theme Advisor who may be contacted through the Biological Sciences Office (212 Biological Sciences Building). Students must select a specific theme area of study as part of their Biological Sciences program. See the information outlining the different theme areas (https://catalog.umanitoba.ca/undergraduate-studies/science/biological-sciences/#Biological-Sciences-Theme-Areas) offered by the Department of Biological Sciences.

To enter the Biological Sciences Honours program a student must have completed at least 24 credit hours with a minimum DGPA of 3.00, and obtained a minimum grade of "B" in BIOL 1030. CHEM 1100, CHEM 1110 (if required for theme), CHEM 1120, STAT 1150 or STAT 1000, and the 3 credit hours of specified Mathematics or Physics are program requirements and students are strongly urged to complete these courses in first year.

To continue in the Biological Sciences Honours program, students must maintain a minimum DGPA of 3.00, and complete a minimum of 9 credit hours during each Fall and Winter Term.

To graduate with the B.Sc. Honours degree, a student must achieve a minimum DGPA of 3.00, and obtain a minimum grade of "C" on the courses that make up the 120 credit hours of the degree.

Honours Co-operative Option

A co-operative education option is available for Honours students. Students should refer to the Co-operative Education (p. 7)for further information on the Co-op programs.

The course, grade requirements and minimum DGPA requirement for entry and continuation in the Co-operative Option are the same as that for regular Honours program.

Before starting the first co-op work term, the following courses must be completed:

Course	Title	Hours
BIOL 1020	Biology 1: Principles and Themes	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions	3
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1120	Introduction to Chemistry Techniques	3
STAT 1150 or STAT 1000	Introduction to Statistics and Computing Basic Statistical Analysis 1	3
3 credit hours of specified Mathematics or Physics		3
BIOL 2300	Principles of Ecology	3
BIOL 2500	Genetics 1	3
BIOL 2520	Cell Biology	3
BIOL 3100	Skills in Biological Sciences	3
In addition, students must complete 9-12 credit hours from program courses as **outlined in the specific theme grids**.		9-12

Degree Requirements

Honours: Cell, Molecular and Developmental Biology Theme (Including Co-operative Option if Selected)

Important Note[1]

Course	Title	Hours
Year 1		
BIOL 1020	Biology 1: Principles and Themes	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions (B)	3
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1120	Introduction to Chemistry Techniques [2]	3
STAT 1150 or STAT 1000	Introduction to Statistics and Computing [3] Or Basic Statistical Analysis 1	3
	Hours	**18**
Years 1-2		
In Year 1 or Year 2 the following must be completed:		
3 credit hours of Mathematics or Physics chosen from:		3
MATH 1240	Elementary Discrete Mathematics [4]	
MATH 1300	Vector Geometry and Linear Algebra [4]	
MATH 1500	Introduction to Calculus [4]	
PHYS 1020 or PHYS 1050	General Physics 1 or Physics 1: Mechanics	
6 credit hours from the Faculty of Arts, including a required "W" course		6
6 credit hours of electives		6
	Hours	**15**
Year 2		
BIOL 2300	Principles of Ecology	3
BIOL 2500	Genetics 1	3
BIOL 2520	Cell Biology	3
Select A or B:		9
A: [5]		
CHEM/MBIO 2700	Biochemistry 1: Biomolecules and an Introduction to Metabolic Energy	
CHEM/MBIO 2710	Biochemistry 2: Catabolism, Synthesis, and Information Pathways	
CHEM 2720	Principles and Practices of the Modern Biochemistry Laboratory	
B: [5]		
CHEM/MBIO 2730	Elements of Biochemistry 1	
CHEM/MBIO 2750	Elements of Biochemistry 2	
CHEM 2740	Introduction to the Biochemistry Laboratory	

BIOL 2200 or BIOL 2210	The Invertebrates or The Chordates	3
One of:		3
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
One additional course from:		3
BIOL 2200	The Invertebrates	
BIOL 2210	The Chordates	
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
BIOL 2420	Human Physiology 2	
BIOL 2600	Introduction to Computational Biology	
CHEM 2100	Organic Chemistry 1: Foundations of Organic Chemistry [5]	
	Hours	**27**
Year 3		
BIOL 3100	Skills in Biological Sciences	3
BIOL 3300	Evolutionary Biology	3
BIOL 3542	Developmental Biology [6]	3
One of:		3
BIOL 3400	Plant Physiology	
BIOL 3470	Environmental Physiology of Animals 1	
BIOL 3472	Environmental Physiology of Animals 2	
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
	Hours	**12**
Years 3-4		
30 credit hours of 3000 or 4000 level Biology courses [7]		30
12 credit hours of electives		12
	Hours	**42**
Year 4		
BIOL 4100	Honours Thesis	6
Co-op Requirements (if selected):		
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	**6**
	Total Hours	**120**

1 The program need not be completed in the manner prescribed in the grid above. The grid indicates one possible arrangement of the 120 credit hours that makes up the degree and is meant to be a guide around which students can plan their program with a view to satisfying the prerequisites of the required courses. These 120 credit hours are a combination of the courses outlined in the grid above and elective courses chosen by the student in consultation with the program advisors.

2 The former courses CHEM 1300 and CHEM 1310 may be used in place of CHEM 1100, CHEM 1110, and CHEM 1120. CHEM 1122 and CHEM 1126 may be used in lieu of CHEM 1120.

3 STAT 1150 is recommended over STAT 1000.

4
- MATH 1230, MATH 1510, MATH 1520, or MATH 1690 may be taken in place of MATH 1500;
- MATH 1220 or MATH 1310 may be taken in place of MATH 1300;
- MATH 1200 may be used in place of MATH 1240.

5 Students are strongly recommended to complete their biochemistry requirements in their second year. The former courses CHEM 2360 (MBIO 2360) and CHEM 2370 (MBIO 2370) may be used in place of CHEM 2700 (MBIO 2700), CHEM 2710 (MBIO 2710), and CHEM 2720. The former courses CHEM 2770 (MBIO 2770) and CHEM 2780 (MBIO 2780) may be used in place of CHEM 2730 (MBIO 2730), CHEM 2740, and CHEM 2750 (MBIO 2750). If the choice of biochemistry courses includes the requirement of CHEM 2100, CHEM 2100 can be used as the additional course listed above. The former CHEM 2210 may be used in place of CHEM 2100.

6 The former BIOL 2540 may be used in place of BIOL 3542.

7 Courses from other departments or faculties may be acceptable for use towards the 30 credit hours of 3000/4000 level Biological Sciences courses required in the Honours program. Please consult with the department theme advisor for permission to use alternate courses.

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

Honours: Ecology and Environmental Biology Theme (Including Co-operative Option if Selected)

Important Note[1]

Course	Title	Hours
Year 1		
BIOL 1020	Biology 1: Principles and Themes	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions (B)	3
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1120	Introduction to Chemistry Techniques [2]	3
STAT 1150 or STAT 1000	Introduction to Statistics and Computing [3] or Basic Statistical Analysis 1	3
	Hours	**15**
Years 1-2		
In Year 1 or Year 2 the following must be completed:		
3 credit hours of Mathematics or Physics chosen from:		3
MATH 1240	Elementary Discrete Mathematics [4]	
MATH 1300	Vector Geometry and Linear Algebra [4]	
MATH 1500	Introduction to Calculus [4]	
PHYS 1020 or PHYS 1050	General Physics 1 or Physics 1: Mechanics	
6 credit hours from the Faculty of Arts, including a required "W" course		6
15 credit hours of electives		15
	Hours	**24**
Year 2		
BIOL 2300	Principles of Ecology	3

BIOL 2500	Genetics 1	3
BIOL 2520	Cell Biology	3
BIOL 2200 or BIOL 2210	The Invertebrates or The Chordates	3
One of:		3
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
One additional course from:		3
BIOL 2200	The Invertebrates	
BIOL 2210	The Chordates	
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
BIOL 2600	Introduction to Computational Biology	
STAT 2150 or STAT 2000	Statistics and Computing [3, 4] or Basic Statistical Analysis 2	3
	Hours	**21**
Year 3		
BIOL 3100	Skills in Biological Sciences	3
BIOL 3300	Evolutionary Biology	3
BIOL 3310	Foundations of Population Ecology	3
BIOL 3312	Community Ecology	3
BIOL 3314	Field Ecology [5]	3
One of:		3
BIOL 3400	Plant Physiology	
BIOL 3470	Environmental Physiology of Animals 1	
BIOL 3472	Environmental Physiology of Animals 2	
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
	Hours	**18**
Years 3-4		
21 credit hours of 3000 or 4000 level Biology courses [6]		21
15 credit hours of electives		15
	Hours	**36**
Year 4		
BIOL 4100	Honours Thesis	6
Co-op Requirements (if selected):		
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	**6**
	Total Hours	**120**

1 The program need not be completed in the manner prescribed in the grid above. The grid indicates one possible arrangement of the 120 credit hours that makes up the degree and is meant to be a guide around which students can plan their program with a view to satisfying the prerequisites of the required courses. These 120 credit hours are a combination of the courses outlined in the grid above and elective courses chosen by the student in consultation with the program advisors.

2 The former courses CHEM 1300 and CHEM 1310 may be used in place of CHEM 1100 and CHEM 1120. CHEM 1122 and CHEM 1126 may be used in lieu of CHEM 1120.

3 STAT 1150 is strongly recommended over STAT 1000; and STAT 2150 is strongly recommended over STAT 2000.

4
- MATH 1230, MATH 1510, MATH 1520, or MATH 1690 may be taken in place of MATH 1500;
- MATH 1220 or MATH 1310 may be taken in place of MATH 1300;
- MATH 1200 may be used in place of MATH 1240.
- Note that STAT 2150 has a prerequisite which requires one of MATH 1230, MATH 1500, MATH 1510, or MATH 1690.

5 With departmental approval, other Field Ecology courses may be used in place of BIOL 3314. A list of possible courses can be found on the Departmental Website.

6 Courses from other departments or faculties may be acceptable for use towards the 21 credit hours of 3000/4000 level Biological Sciences courses required in the Honours program. Please consult with the department theme advisor for permission to use alternate courses.

Honours: Environmental and Integrative Physiology Theme (Including Co-operative Option if Selected)

Important Note[1]

Course	Title	Hours
Year 1		
BIOL 1020	Biology 1: Principles and Themes	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions (B)	3
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3
CHEM 1120	Introduction to Chemistry Techniques [2]	3
STAT 1150 or STAT 1000	Introduction to Statistics and Computing [3] or Basic Statistical Analysis 1	3
	Hours	**18**
Years 1-2		
In Year 1 or Year 2 the following must be completed:		
3 credit hours of Mathematics or Physics chosen from:		3
MATH 1240	Elementary Discrete Mathematics [4]	
MATH 1300	Vector Geometry and Linear Algebra [4]	
MATH 1500	Introduction to Calculus [4]	
PHYS 1020 or PHYS 1050	General Physics 1 or Physics 1: Mechanics	
6 credit hours from the Faculty of Arts, including a required "W" course		6
3-6 credit hours of electives [5]		3-6
	Hours	**15**

Year 2		
BIOL 2300	Principles of Ecology	3
BIOL 2500	Genetics 1	3
BIOL 2520	Cell Biology	3
BIOL 2200 or BIOL 2210	The Invertebrates or The Chordates	3
One of:		3
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
One additional course from:		3
BIOL 2200	The Invertebrates	
BIOL 2210	The Chordates	
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
BIOL 2420	Human Physiology 2	
BIOL 2600	Introduction to Computational Biology	
Select A or B:		9
A: [5]		
CHEM/MBIO 2700	Biochemistry 1: Biomolecules and an Introduction to Metabolic Energy	
CHEM/MBIO 2710	Biochemistry 2: Catabolism, Synthesis, and Information Pathways	
CHEM 2720	Principles and Practices of the Modern Biochemistry Laboratory	
B: [5]		
CHEM/MBIO 2730	Elements of Biochemistry 1	
CHEM/MBIO 2750	Elements of Biochemistry 2	
CHEM 2740	Introduction to the Biochemistry Laboratory	
	Hours	**27**
Year 3		
BIOL 3100	Skills in Biological Sciences	3
BIOL 3300	Evolutionary Biology	3
Three of:		9
BIOL 3400	Plant Physiology	
BIOL 3452	Environmental Plant Physiology	
BIOL 3470	Environmental Physiology of Animals 1	
BIOL 3472	Environmental Physiology of Animals 2	
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
	Hours	**15**
Years 3-4		
24 credit hours of 3000 or 4000 level Biology courses [6]		24
15 credit hours of electives		15
	Hours	**39**
Year 4		
BIOL 4100	Honours Thesis	6
Co-op Requirements (if selected):		
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	**6**
	Total Hours	**120**

1 The program need not be completed in the manner prescribed in the grid above. The grid indicates one possible arrangement of the 120 credit hours that makes up the degree and is meant to be a guide around which students can plan their program with a view to satisfying the prerequisites of the required courses. These 120 credit hours are a combination of the courses outlined in the grid above and elective courses chosen by the student in consultation with the program advisors.

2 The former courses CHEM 1300 and CHEM 1310 may be used in place of CHEM 1100, CHEM 1110, and CHEM 1120. CHEM 1122 and CHEM 1126 may be used in lieu of CHEM 1120.

3 STAT 1150 is recommended over STAT 1000.

4
- MATH 1230, MATH 1510, MATH 1520, or MATH 1690 may be taken in place of MATH 1500;
- MATH 1220 or MATH 1310 may be taken in place of MATH 1300;
- MATH 1200 may be used in place of MATH 1240.

5 The former courses CHEM 2360 (MBIO 2360) and CHEM 2370 (MBIO 2370) may be used in place of CHEM 2700 (MBIO 2700), CHEM 2710 (MBIO 2710), and CHEM 2720. The former courses CHEM 2770 (MBIO 2770) and CHEM 2780 (MBIO 2780) may be used in place of CHEM 2730 (MBIO 2730), CHEM 2740, and CHEM 2750 (MBIO 2750). Number of credit hours of electives depends on the choice of Biochemistry courses and the inclusion of CHEM 2100 (or the former CHEM 2210).

6 Courses from other departments or faculties may be acceptable for use towards the 24 credit hours of 3000/4000 level Biological Sciences courses required in the Honours program. Please consult with the department for permission to use alternate courses.

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

Honours: Evolution and Biodiversity Theme (Including Co-operative Option if Selected)

Important Note[1]

Course	Title	Hours
Year 1		
BIOL 1020	Biology 1: Principles and Themes	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions (B)	3
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1120	Introduction to Chemistry Techniques [2]	3
STAT 1150 or STAT 1000	Introduction to Statistics and Computing [3] or Basic Statistical Analysis 1	3
	Hours	**15**
Years 1-2		
In Year 1 or Year 2 the following must be completed:		
3 credit hours of Mathematics or Physics chosen from:		3
MATH 1240	Elementary Discrete Mathematics [4]	

MATH 1300	Vector Geometry and Linear Algebra [4]	
MATH 1500	Introduction to Calculus [4]	
PHYS 1020 or PHYS 1050	General Physics 1 or Physics 1: Mechanics	
6 credit hours from the Faculty of Arts, including a required "W" course		6
15 credit hours of electives		15
	Hours	**24**
Year 2		
BIOL 2300	Principles of Ecology	3
BIOL 2500	Genetics 1	3
BIOL 2520	Cell Biology	3
BIOL 2200 or BIOL 2210	The Invertebrates or The Chordates	3
One of:		3
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
One additional course from:		3
BIOL 2200	The Invertebrates	
BIOL 2210	The Chordates	
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
STAT 2150 or STAT 2000	Statistics and Computing [3,4] or Basic Statistical Analysis 2	3
	Hours	**21**
Year 3		
BIOL 3100	Skills in Biological Sciences	3
BIOL 3300	Evolutionary Biology	3
One of:		3
BIOL 3400	Plant Physiology	
BIOL 3470	Environmental Physiology of Animals 1	
BIOL 3472	Environmental Physiology of Animals 2	
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
	Hours	**9**
Years 3-4		
One of:		3
BIOL 3360	Animal Behaviour	
BIOL 4300	Evolution and Adaptation	
BIOL 4362	Behavioural Ecology and Cognitive Ethology	
BIOL 4510	Evolutionary Genetics	
One of:		3
BIOL 3200	Advanced Invertebrate Biology	
BIOL 3242	Vascular Flora of Manitoba	
BIOL 3250	Lichens and Bryophytes	
BIOL 3270	Introductory Parasitology	
BIOL 3340	Biology of Primitive Fungi and Allies	
BIOL 4212	Systematics and Biogeography of Fishes	
BIOL 4214	Biology of Amphibians and Reptiles	
BIOL 4216	Biology of Birds	
BIOL 4218	Biology of Mammals	
24 credit hours of 3000 or 4000 level Biology courses [5]		24
15 credit hours of electives		15
	Hours	**45**
Year 4		
BIOL 4100	Honours Thesis	6
Co-op Requirements (if selected):		
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	**6**
	Total Hours	**120**

1 The program need not be completed in the manner prescribed in the grid above. The grid indicates one possible arrangement of the 120 credit hours that make up the degree and is meant to be a guide around which students can plan their program with a view to satisfying the prerequisites of the required courses. These 120 credit hours are a combination of the courses outlined in the grid above and elective courses chosen by the student in consultation with the program advisors.

2 The former courses CHEM 1300 and CHEM 1310 may be used in place of CHEM 1100 and CHEM 1120. CHEM 1122 and CHEM 1126 may be used in lieu of CHEM 1120.

3 STAT 1150 is strongly recommended over STAT 1000; and STAT 2150 is strongly recommended over STAT 2000.

4
- MATH 1230, MATH 1510, MATH 1520, or MATH 1690 may be taken in place of MATH 1500;
- MATH 1220 or MATH 1310 may be taken in place of MATH 1300;
- MATH 1200 may be used in place of MATH 1240.

Note that STAT 2150 has a prerequisite of one of MATH 1230, MATH 1500, or MATH 1690.

5 Courses from other departments or faculties may be acceptable for use towards the 24 credit hours of 3000/4000 level Biological Sciences courses required in the Honours Degree program. Please consult with the theme advisor for permission to use alternate courses.

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

Honours: Integrative Biology Theme (Including Co-operative Option if Selected)

Important Note[1]

Course	Title	Hours
Year 1		
BIOL 1020	Biology 1: Principles and Themes	3
BIOL 1030	Biology 2: Biological Diversity, Function and Interactions (B)	3
CHEM 1100	Introductory Chemistry 1: Atomic and Molecular Structure and Energetics	3
CHEM 1110	Introductory Chemistry 2: Interaction, Reactivity, and Chemical Properties	3

CHEM 1120	Introduction to Chemistry Techniques [2]	3
MBIO 1010	Microbiology I	3
STAT 1150 or STAT 1000	Introduction to Statistics and Computing [3] or Basic Statistical Analysis 1	3
	Hours	**21**

Years 1-2

In Year 1 or Year 2 the following must be completed:

3 credit hours of Mathematics or Physics chosen from:		3
MATH 1240	Elementary Discrete Mathematics [4]	
MATH 1300	Vector Geometry and Linear Algebra [4]	
MATH 1500	Introduction to Calculus [4]	
PHYS 1020 or PHYS 1050	General Physics 1 or Physics 1: Mechanics	
6 credit hours from the Faculty of Arts, including a required "W" course		6
0-3 credit hours of electives [5]		0-3
	Hours	**12**

Year 2

BIOL 2300	Principles of Ecology	3
BIOL 2500	Genetics 1	3
BIOL 2520	Cell Biology	3
Three of:		9
BIOL 2200	The Invertebrates	
BIOL 2210	The Chordates	
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
One additional course from:		3
BIOL 2200	The Invertebrates	
BIOL 2210	The Chordates	
BIOL 2240	The Non-Flowering Plants	
BIOL 2242	The Flowering Plants	
BIOL 2260	Biology of Fungi and Lichens	
BIOL 2262	Biology of Algae	
BIOL 2420	Human Physiology 2	
BIOL 2600	Introduction to Computational Biology	
Select A or B:		6
A - two of: [5]		
CHEM/MBIO 2700	Biochemistry 1: Biomolecules and an Introduction to Metabolic Energy	
CHEM/MBIO 2710	Biochemistry 2: Catabolism, Synthesis, and Information Pathways	
CHEM 2720	Principles and Practices of the Modern Biochemistry Laboratory	
B - two of: [5]		
CHEM/MBIO 2730	Elements of Biochemistry 1	
CHEM/MBIO 2750	Elements of Biochemistry 2	
CHEM 2740	Introduction to the Biochemistry Laboratory	
	Hours	**27**

Year 3

BIOL 3100	Skills in Biological Sciences	3
BIOL 3300	Evolutionary Biology	3
One of:		3
BIOL 3400	Plant Physiology	
BIOL 3470	Environmental Physiology of Animals 1	
BIOL 3472	Environmental Physiology of Animals 2	
Co-op Requirements (if selected):		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
	Hours	**9**

Years 3-4

24 credit hours of 3000 or 4000 level Biological Sciences courses [6]		24
6 credit hours of 3000 or 4000 level Microbiology courses [7]		6
15 credit hours of electives		15
	Hours	**45**

Year 4

BIOL 4100	Honours Thesis	6
Co-op Requirements (if selected):		
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	**6**
	Total Hours	**120**

1. The program need not be completed in the manner prescribed in the grid above. The grid indicates one possible arrangement of the 120 credit hours that makes up the degree and is meant to be a guide around which students can plan their program with a view to satisfying the prerequisites of the required courses. These 120 credit hours are a combination of the courses outlined in the grid above and elective courses chosen by the student in consultation with the program advisor.
2. The former courses CHEM 1300 and CHEM 1310 may be used in place of CHEM 1100, CHEM 1110, and CHEM 1120. CHEM 1122 and CHEM 1126 may be used in lieu of CHEM 1120.
3. STAT 1150 is recommended over STAT 1000.
4.
   - MATH 1230, MATH 1510, MATH 1520, or MATH 1690 may be taken in place of MATH 1500;
   - MATH 1220 or MATH 1310 may be taken in place of MATH 1300;
   - MATH 1200 may be used in place of MATH 1240.
5. The former courses CHEM 2360 (MBIO 2360) and CHEM 2370 (MBIO 2370) may be used in place of CHEM 2700 (MBIO 2700), CHEM 2710 (MBIO 2710), and CHEM 2720. The former courses CHEM 2770 (MBIO 2770) and CHEM 2780 (MBIO 2780) may be used in place of CHEM 2730 (MBIO 2730), CHEM 2740, and CHEM 2750 (MBIO 2750). Number of credit hours of electives depends on the choice of Biochemistry courses and the inclusion of CHEM 2100 (or the former CHEM 2210).
6. Courses from other departments or faculties may be acceptable for use towards the 24 credit hours of 3000/4000 level Biological Sciences courses required in the Honours Degree program. Please consult with the theme advisor for permission to use alternate courses.
7. Many MBIO courses have specific biochemistry requirements. Students are advised to plan ahead to take all required courses. If a student takes more than 6 credit hours of biochemistry, they will count as electives.

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

Co-operative Education

Co-operative Education Option Academic Regulations: B.Sc. (Major) & B.Sc. and B.C.Sc. (Honours)

Co-operative education is a form of experiential learning which integrates the academic education (classroom-based learning) of interested and qualified students with relevant, supervised, and paid work experience (work-based learning) with employers. Co-op students gain valuable skills to guide them through their academic education and prepare them for future careers after graduation.

The Faculty of Science offers a Co-operative Education Option in the following Major programs:

- Biochemistry
- Biological Sciences
- Biotechnology (As of Fall 2018, admission to the Biotechnology programs has been temporarily suspended. For further information, see the Faculty of Science office.)
- Chemistry
- Computer Science
- Data Science
- Genetics
- Mathematics
- Microbiology
- Physics & Astronomy
- Psychology
- Statistics.

The Honours programs offering a Co-operative Education Option are:

- Biochemistry
- Biological Sciences
- Biotechnology (As of Fall 2018, admission to the Biotechnology programs has been temporarily suspended. For further information, see the Faculty of Science office.)
- Chemistry
- Computer Science
- Genetics
- Mathematics
- Microbiology
- Physics & Astronomy
- Statistics
- Joint Computer Science – Mathematics
- Joint Computer Science – Physics and Astronomy
- Joint Computer Science – Statistics
- Joint Mathematics – Physics and Astronomy
- Joint Statistics – Mathematics program.

Co-operative education is optional and supplementary to academic requirements of the chosen degree. All regulations governing regular Major and Honours programs apply to the Co-operative Education Option. In addition, the following variations apply:

Entrance

To enter the Co-operative Education Option a student must be eligible to enter the Major or Honours program offered by the department. At the time of application, students must have a minimum Degree Grade Point Average (DGPA) of 2.5 for the Major and 3.0 for the Honours Programs. For Psychology, students must have a minimum Degree Grade Point Average (DGPA) of 3.0 for the Major. Co-op is not available for students in the Honours Psychology Program.

The normal point of entry to the Co-operative Education Option is following the completion of second year in the Faculty of Science. Students seeking admission will submit an application during their second year and complete an intake process with the appropriate departmental Co-op Coordinator. Application deadlines are established by the Science Co-op Office.

Students are advised that satisfying the entrance requirements does not guarantee a place in the Co-operative Education Option. The Science Co-op Office reserves the right to determine and select the best-qualified applicants.

Students admitted into the Co-operative Education Option will complete pre-employment training, including workshops, prior to the start of their first co-op work term. The structure and content of this training is developed by the Science Co-op Office. Attendance and completion of this training is mandatory.

Structure and Sequencing

The Co-operative Education Option consists of both academic terms and co-op work terms.

Each academic term can be either four months in duration or eight months in duration, as designated by the Major or Honours department.

Each co-op work term can be either four months in duration or eight months in duration, as designated by the Science Co-op Office. An eight month work term would be counted as the equivalent of two 4 month terms.

Each academic term and each co-op work term will commence in January, May or September.

The sequence of academic terms and co-op work terms is variable to suit the needs of each department, and is designated by the Science Co-op Office in conjunction with each Major or Honours department. All Faculty of Science Co-operative Education Options must end on an academic term.

Students are expected to follow the academic/co-op work term sequence defined by their Major or Honours department from admission through to graduation.

Co-op Work Term Requirements

All Co-operative Education Options require participating students to complete at least three (3) 4-month co-op work terms for a total of a minimum of 12 months' work experience. Each co-op work term is completed with one employer.

Students are required to register in the appropriate co-op work term course and pay the work term fee prior to starting their co-op work term.

Co-operative Education Option students are required to submit a work term report at the end of each co-op work term. These reports are due at times designated by the Science Co-op Office. In order to remain in the Co-operative Education program, a student must obtain a grade of "Pass"

for each work term report. The Science Co-op Office will provide students with instructions regarding the content and format requirements of the work term reports.

While on a co-op work term, students are not permitted to take more than six hours of academic credit, and may not take more than one course at a time.

Academic Term Requirements

Coursework requirements of the Co-operative Education Option are equivalent to the coursework requirements of the four-year Major program. For students completing an Honours program, the coursework requirements of the Co-operative Education Option are equivalent to the coursework requirements of the Honours program with the exception of the Biochemistry, Biotechnology, Genetics and Microbiology programs.

Co-operative Education Option students are required to maintain full-time study while registered for an academic term.

To continue in a four year Major Co-operative Education Option, students must maintain a minimum DGPA of 2.50 at each point of assessment; except for students in Psychology where a minimum DGPA of 3.00 must be maintained at each point of assessment. A student's performance will be evaluated following each academic term. In addition, the student must meet all individual course prerequisites for further study and departmental continuation and graduation requirements. Please see department entries for further information. Continuation in the Major Co-operative Education Option is also contingent upon satisfactory performance during co-op work terms.

To continue in an Honours Co-operative Education Option a student must maintain a minimum DGPA of 3.00 or higher at each point of assessment. A student's performance will be evaluated following each academic term. In addition, the student must meet all individual course prerequisites for further study and departmental continuation and graduation requirements. Please see department entries for further information. Continuation in the Honours Co-operative Education Option is also contingent upon satisfactory performance during co-op work terms.

Students may be required to withdraw from the Co-operative Education Option for any of the following reasons:

- Failure to maintain the minimum academic requirements of the Faculty of Science and/or Major/Honours program.
- Failure to maintain the minimum credit hour requirements of the academic term in the co-op option.
- Unsatisfactory performance during a co-op work term.
- Failure to submit a co-op work term report or the submitted report does not achieve a "Pass" grade.
- Failure to observe the policies outlined in university governing documents related to Behavioural Policies and Academic Misconduct.
- Having consulted with the Co-op Director and/or Faculty Advisor, in the opinion of the Co-op Coordinator, the student does not possess sufficient ability, skills, aptitude, attitude, diligence or motivation to successfully complete the Co-operative Education Option.

Students who wish to voluntarily withdraw from the Co-operative Education Option must obtain the written approval from their Co-op Coordinator and the Science Co-op Director. Students must submit their withdrawal request to their Co-op Coordinator and receive approval by the withdrawal dates set by the Science Co-op Office for each co-op work term.

Students are not normally permitted to withdraw from the Co-operative Education Option once they have secured a position for their co-op work term; whether the position was obtained through the Science Co-op Office or through students' own self-directed job search. Enrollment in the applicable co-op course(s) will be maintained and students are responsible for all assessed fees for the duration of the co-op work term and for meeting all academic requirements.

Students who accumulate more than 18 credit hours of failed courses after entering the four-year Major program (regardless of the origin of the grade or if the course has been repeated) will be required to withdraw from the Major Co-op program. Students are also subject to the academic assessment policy found in the Faculty Academic Regulations (https://catalog.umanitoba.ca/undergraduate-studies/science/#facultyacademicregulationstext).

Students who accumulate more than 15 credit hours of failed courses after entering the Honours degree program (regardless of the origin of the grade or if the course has been repeated) will be required to withdraw from the Honours Co-op program. Students required to withdraw from the Honours program may be eligible to pursue the B.Sc. Major program or the B.Sc. General degree program. Students are also subject to the academic assessment policy found in the Faculty Academic Regulations (https://catalog.umanitoba.ca/undergraduate-studies/science/#facultyacademicregulationstext).

Four year Major Co-operative Education Option students who are required to withdraw, or voluntarily revert to an alternative degree program must fulfil all academic requirements of that degree.

Honours Co-operative Education Option students who are required to withdraw or voluntarily revert to an alternative degree program must fulfill all academic requirements of that degree.