

MARINE AND FRESHWATER BIOLOGY (MFB)

Department of Integrative Biology, College of Biological Science

The Marine and Freshwater Biology major capitalizes on Guelph's recognized excellence in aquatic research and provides a broad perspective on aquatic environments based on the physical as well as the biological sciences. In this major, students will build upon core courses in ecology, evolution, genetics, and physiology of aquatic biota as they study freshwater and marine environments and work with aquatic organisms experimentally in the field and in the lab. They will have the opportunity to perform independent research projects under a variety of field and laboratory conditions to enhance their learning experience. The major prepares students for post-graduate work in the aquatic sciences, and provides a sound scientific background for students wishing to pursue careers in academia, government service, private sector (e.g., NGOs, fisheries, aquaculture, biotechnology, consulting), conservation, education and research.

Major Requirements (Honours)

This is a major within the degree: Bachelor of Science
(calendar.uoguelph.ca/undergraduate-calendar/degree-programs/bachelor-science-bsc/).

Students may enter this major in Semester 1 or any semester thereafter. A student wishing to declare the major may wish to consult the Faculty Advisor. A minimum total of 20.00 credits is required to complete the major.

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bsc/revised_SS/.

Code	Title	Credits
Semester 1		
BIOL*1070	Discovering Biodiversity	0.50
CHEM*1040	General Chemistry I	0.50
MATH*1080	Elements of Calculus I	0.50
PHYS*1080	Physics for Life Sciences	0.50
0.50 Liberal Education electives		0.50
Semester 2		
BIOL*1080	Biological Concepts of Health	0.50
BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
CHEM*1050	General Chemistry II	0.50
PHYS*1070	Physics for Life Sciences II	0.50
0.50 Liberal Education electives		0.50
Semester 3		
BIOL*2060	Ecology	0.50
BIOL*2400	Evolution	0.50
ZOO*2090	Vertebrate Structure and Function	0.50
1.00 electives ¹		1.00
Semester 4		
BIOC*2580	Introduction to Biochemistry	0.50
MBG*2040	Foundations in Molecular Biology and Genetics	0.50

STAT*2230	Biostatistics for Integrative Biology	0.50
ZOO*2700	Invertebrate Morphology & Evolution	0.50
0.50 electives ¹		0.50
Semester 5		
BIOL*3450	Introduction to Aquatic Environments	0.50
ZOO*3600	Comparative Animal Physiology I	0.50
ZOO*3610	Lab Studies in Animal Physiology I	0.25
ZOO*3700	Integrative Biology of Invertebrates	0.50
Electives to a maximum of 2.75 total credits in this semester.		1.00
Semester 6		
BIOL*3060	Populations, Communities and Ecosystems	0.50
ZOO*3050	Developmental Biology	0.50
ZOO*3620	Comparative Animal Physiology II	0.50
ZOO*3630	Lab Studies in Animal Physiology II	0.25
Electives to a maximum of 2.75 total credits in this semester.		1.00
Semester 7		
BIOL*4350	Limnology of Natural and Polluted Waters	0.50
IBIO*4600	Integrative Marine and Freshwater Research	1.00
1.00 electives		1.00
Semester 8		
BIOL*4010	Adaptational Physiology	0.50
ZOO*4330	Biology of Fishes	0.50
ZOO*4570	Marine Ecological Processes	0.50
1.00 electives		1.00

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CIS*1200 Introduction to Computing is recommended for those needing to improve their computer skills

Electives

A minimum of 1.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at: <https://www.uoguelph.ca/bsc/>

Credit Summary

(20.00 Total Credits)

Code	Title	Credits
First year science core		4.00
Required science courses semesters 3 - 8		10.00
Approved Science Electives		2.00
Liberal Education Electives		1.00
Free Electives - any approved elective for B.Sc. Students		3.00
Total Credits		20

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Co-op Requirements (Honours)

This is a major within the degree: Bachelor of Science
(calendar.uoguelph.ca/undergraduate-calendar/degree-programs/bachelor-science-bsc/).

The Co-op program in Marine and Freshwater Biology is a five year program, including five work terms. Students must follow the academic work schedule as outlined below (also found on the Co-operative Education website: <https://www.recrutguelph.ca/cecs/>).

Academic and Co-op Work Term Schedule

Year	Fall	Winter	Summer
1	Academic Semester 1	Academic Semester 2	Off
2	Academic Semester 3 COOP*1100	Academic Semester 4	COOP*1000 Work Term I
3	Academic Semester 5	COOP*2000 Work Term II	COOP*3000 Work Term III
4	Academic Semester 6	Academic Semester 7	COOP*4000 Work Term IV
5	COOP*5000 Work Term V	Academic Semester 8	N/A

Please refer to the Co-operative Education program policy with respect to work term performance grading, work term report grading and program completion requirements.

For additional program information students should consult with their Co-op Co-ordinator and Co-op Faculty Advisor, listed on the Co-operative Education web site.

Credit Summary

(22.50 Total Credits)

Code	Title	Credits
	First year science core	4.00
	Required science courses semesters 3 - 8	10.00
	Approved Science Electives	2.00
	Liberal Education Electives	1.00
	Free Electives - any approved elective for B.Sc. Students	3.00
	Co-op Work Terms	2.50
	Total Credits	22.5

Of the total credits required, students are required to complete 16.00 credits in science of which a minimum of 2.00 credits must be at the 4000 level and an additional 4.00 credits must be at the 3000 or 4000 level.

Recommended Program Sequence

Students lacking Grade 12 or 4U Biology, Chemistry or Physics should follow the revised schedule of study for this major found at https://www.uoguelph.ca/bsc/revised_SS/.

Code	Title	Credits
Semester 1 - Fall		
BIOL*1070	Discovering Biodiversity	0.50
CHEM*1040	General Chemistry I	0.50
MATH*1080	Elements of Calculus I	0.50
PHYS*1080	Physics for Life Sciences	0.50
	0.50 Liberal Education electives	0.50
Semester 2 - Winter		
BIOL*1080	Biological Concepts of Health	0.50

BIOL*1090	Introduction to Molecular and Cellular Biology	0.50
CHEM*1050	General Chemistry II	0.50
PHYS*1070	Physics for Life Sciences II	0.50
	0.50 Liberal Education electives	0.50

Summer Semester

No academic semester or work term

Semester 3 - Fall

BIOL*2060	Ecology	0.50
BIOL*2400	Evolution	0.50
COOP*1100	Introduction to Co-operative Education	0.00
ZOO*2090	Vertebrate Structure and Function	0.50
	1.00 electives or restricted electives ²	1.00

Semester 4 - Winter

BIOC*2580	Introduction to Biochemistry	0.50
MBG*2040	Foundations in Molecular Biology and Genetics	0.50
STAT*2230	Biostatistics for Integrative Biology	0.50
ZOO*2700	Invertebrate Morphology & Evolution	0.50
	0.50 electives or restricted electives ²	0.50

Summer Semester

COOP*1000	Co-op Work Term I	0.50
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Semester 5 - Fall

BIOL*3450	Introduction to Aquatic Environments	0.50
ZOO*3600	Comparative Animal Physiology I	0.50
ZOO*3610	Lab Studies in Animal Physiology I	0.25
ZOO*3700	Integrative Biology of Invertebrates	0.50
	Electives or restricted electives to a maximum of 2.75 total credits in this semester	1.00

Winter Semester

COOP*2000	Co-op Work Term II	0.50
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Summer Semester

COOP*3000	Co-op Work Term III	0.50
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Semester 6 - Fall

BIOL*4350	Limnology of Natural and Polluted Waters	0.50
IBIO*4600	Integrative Marine and Freshwater Research	1.00
	1.00 electives or restricted electives	1.00

Semester 7 - Winter

BIOL*3060	Populations, Communities and Ecosystems	0.50
ZOO*3050	Developmental Biology	0.50
ZOO*3620	Comparative Animal Physiology II	0.50
ZOO*3630	Lab Studies in Animal Physiology II	0.25
	Electives or restricted electives to a maximum of 2.75 total credits in this semester.	1.00

Summer Semester

COOP*4000	Co-op Work Term IV	0.50
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Fall Semester

COOP*5000	Co-op Work Term V	0.50
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Semester 8 - Winter

BIOL*4010	Adaptational Physiology	0.50
ZOO*4330	Biology of Fishes	0.50

ZOO*4570	Marine Ecological Processes	0.50
1.00	electives or restricted electives	1.00

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CIS*1200 Introduction to Computing is recommended for those needing to improve their computer skills

Electives

A minimum of 1.00 credits of Liberal Education electives is required. The list of Liberal Education electives for B.Sc. students can be found at:
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