

MOLECULAR BIOLOGY AND GENETICS (MBG)

Department of Molecular and Cellular Biology, College of Biological Science

The B.Sc. program with a Major in Molecular Biology and Genetics is a broadly based program in genetics including related areas of cell and molecular biology. In consultation with the Faculty Advisor, students can choose a general program or can focus their courses in areas such as molecular biology, cell biology, developmental biology, genetics, or agricultural genetics. The program qualifies students for postgraduate training in cell or molecular biology and genetics including clinical genetics and genetic counselling, and provides an excellent background for careers in biotechnology, toxicology, agriculture and medical research. 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.

Major (Honours Program)

A 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 (https://www.uoguelph.ca/bsc/revised_SS/)

Code	Title	Credits
Semester 1		
BIOL*1090	Introduction to Molecular and Cellular Biology	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*1070	Discovering Biodiversity	0.50
BIOL*1080	Biological Concepts of Health	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		
BIOC*2580	Introduction to Biochemistry	0.50
MBG*2040	Foundations in Molecular Biology and Genetics	0.50
MICR*2420	Introduction to Microbiology	0.50
STAT*2040	Statistics I	0.50
0.50 Liberal Education electives		0.50
Semester 4		
BIOC*3560	Structure and Function in Biochemistry	0.50
CHEM*2700	Organic Chemistry I	0.50
MCB*2050	Molecular Biology of the Cell	0.50
MICR*2430	Methods in Microbial Culture and Physiology	0.50
0.50 Liberal Education electives		0.50

Semester 5

MBG*3040	Molecular Biology of the Gene	0.50
MBG*3350	Laboratory Methods in Molecular Biology	0.75
Electives or Restricted Electives to a maximum of 2.75 total credits in this semester.		1.50

Semester 6

2.50 electives or restricted electives		2.50
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Semester 7 ¹

MCB*4500	Research Project in Molecular and Cellular Biology I	1.00
1.50 electives or restricted electives		1.50

Semester 8 ¹

MCB*4510	Research Project in Molecular and Cellular Biology	1.00
1.50 electives or restricted electives		1.50

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Instead of the 2 semester sequence of MCB*4500 Research Project in Molecular and Cellular Biology I / MCB*4510 Research Project in Molecular and Cellular Biology students may choose to take MCB*4600 Topics in Molecular and Cellular Biology and 1.50 subject area electives at the 4000 level.

Restricted Electives

Note: Some courses have prerequisites, so be sure to consult the undergraduate calendar.

- A minimum of 2.00 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/>
- Physiology Elective - 0.50 credits

Code	Title	Credits
BIOM*3200	Biomedical Physiology	1.00
BOT*3310	Plant Growth and Development	0.50
HK*2810	Human Physiology I - Concepts and Principles	0.50
ZOO*3600	Comparative Animal Physiology I	0.50

- Subject Area Electives - 2.50 credits (4.00 if MCB*4600 Topics in Molecular and Cellular Biology is taken instead of MCB*4500 Research Project in Molecular and Cellular Biology I and MCB*4510 Research Project in Molecular and Cellular Biology)

Code	Title	Credits
BIOC*4050	Protein and Nucleic Acid Structure	0.50
BIOL*3020	Population Genetics	0.50
BIOL*3300	Applied Bioinformatics	0.50
MBG*2400	Fundamentals of Plant and Animal Genetics	0.50
MBG*3050	Human Genetics	0.50
MBG*3060	Quantitative Genetics	0.50
MBG*3100	Plant Genetics	0.50
MBG*3660	Genomics	0.50
MBG*4030	Animal Breeding Methods and Applications	0.50

MBG*4040	Genetics and Molecular Biology of Development	0.50	MBG*3660	Genomics	0.50
MBG*4110	Epigenetics	0.50	MBG*4030	Animal Breeding Methods and Applications	0.50
MBG*4160	Plant Breeding	0.50	MBG*4040	Genetics and Molecular Biology of Development	0.50
MBG*4240	Applied Molecular Genetics in Medicine and Biotechnology	0.50	MBG*4110	Epigenetics	0.50
MBG*4270	DNA Replication, Recombination and Repair	0.50	MBG*4160	Plant Breeding	0.50
MBG*4300	Plant Molecular Genetics	0.50	MBG*4240	Applied Molecular Genetics in Medicine and Biotechnology	0.50
MCB*3010	Dynamics of Cell Function and Signaling	0.50	MBG*4270	DNA Replication, Recombination and Repair	0.50
MCB*4010	Advanced Cell Biology	0.50	MBG*4300	Plant Molecular Genetics	0.50
MICR*3240	Microbial Physiology and Genetics	0.50	MCB*3010	Dynamics of Cell Function and Signaling	0.50
MICR*3280	Microbial Cell Biology	0.50	MCB*4010	Advanced Cell Biology	0.50
MICR*3330	World of Viruses	0.50	MICR*3240	Microbial Physiology and Genetics	0.50
MICR*4330	Molecular Virology	0.50	MICR*3280	Microbial Cell Biology	0.50
STAT*2050	Statistics II	0.50	MICR*3330	World of Viruses	0.50
			MICR*4330	Molecular Virology	0.50

Credit Summary

(20.00 Total Credits)

Code	Title	Credits
	First year science core	4.00
	Required science courses semesters 3 - 8	7.25
	Restricted electives (#2 and 3 in restricted electives list)	3.00
	Approved Science Electives	1.75
	Liberal Education Electives (# 1 in restricted elective list)	2.00
	Free Electives - any approved elective for B.Sc. Students	2.00
	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.

Minor (Honours Program)

A minor in Molecular Biology and Genetics requires 5.00 credits in Molecular Biology and Genetics chosen in consultation with the faculty advisor, and will include:

Code	Title	Credits
MBG*2040	Foundations in Molecular Biology and Genetics	0.50
MCB*2050	Molecular Biology of the Cell	0.50
	Select a minimum of 4.00 credits from the following:	
BIOC*3560	Structure and Function in Biochemistry	0.50
BIOC*4050	Protein and Nucleic Acid Structure	0.50
BIOL*3020	Population Genetics	0.50
BIOL*3300	Applied Bioinformatics	0.50
MBG*2400	Fundamentals of Plant and Animal Genetics	0.50
MBG*3040	Molecular Biology of the Gene	0.50
MBG*3050	Human Genetics	0.50
MBG*3060	Quantitative Genetics	0.50
MBG*3100	Plant Genetics	0.50
MBG*3350	Laboratory Methods in Molecular Biology	0.75