MICROBIOLOGY AND IMMUNOLOGY (MIMM)

Department of Molecular and Cellular Biology, College of Biological Science

The Microbiology and Immunology program is designed to give students strong theoretical foundations and hands-on practical skills for diverse careers in microbiology, immunology and health-related sciences. The program integrates molecular genetics, cellular, biochemical and metabolic concepts to develop a fundamental understanding of microbial diversity, structure/function relationships and microbial associations. Furthermore, an in-depth understanding of the human immune system, characteristics of immune responses to microbial-host interactions, antimicrobial interventions and microbial defence mechanisms will a fundamental and integrated understanding of the roles of microbes in overall health and disease. The program further develops practical skills in biochemistry, molecular biology, microbiology, immunology, microbial-host interactions, and bioinformatics, including genomics and proteomics approaches, to prepare graduates for career opportunities in human health and disease, agriculture, and biotechnology.

Students can take the B.Sc. program with a major in Microbiology and Immunology or combine a Microbiology minor with another major. Students should plan their programs in consultation with the Microbiology and Immunology faculty advisor. As course offerings may change during the program, students are strongly encouraged to review their plans at least once a year with their advisors, and to check the departmental website for program news.

Major Requirements (Honours)

This is a major within the degree: Bachelor of Science.

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.

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 and Immunity	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
MCB*2050	Molecular Biology of the Cell	0.50
MICR*2430	Methods in Microbial Culture and Physiology	0.50
0.50 electives		0.50
0.50 Liberal Education electives		0.50
Semester 5		
MICR*3230	Immunology	0.50
MICR*3400	Microbial Diversity and Bioinformatics	0.50
MBG*3350	Laboratory Methods in Molecular Biology	0.75
Electives or restricted electives up to 2.75 credits		0.75
Semester 6		
MICR*3240	Microbial Physiology and Genetics	0.50
MCB*3440	Methods in Immunology	0.75
Electives or restricted electives up to 2.75 credits		1.25
Semester 7		
MICR*4350	Research Methods in Microbial-Host Interactions	0.75
MICR*4540	Antibiotics, Resistance & Microbial Defence Mechanisms	0.50
Electives or restricted electives up to 2.75 credits [1]		1.25
Semester 8		
MICR*4250	Microbiome and Immunity	0.50
2.00 electives or restricted electives [2]		2.00

1. Can include MCB*4500 Research Project in Molecular and Cellular Biology I
2. Can include MCB*4510 Research Project in Molecular and Cellular Biology

Restricted Electives

1. 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/
2. 2.00 restricted elective credits of which 1.00 credits must be at the 4000 level.

Code	Title	Credits
BIOC*4050	Protein and Nucleic Acid Structure	0.50
BIOC*4520	Metabolic Processes	0.50
BIOC*4540	Enzymology	0.75
BIOC*4580	Membrane Biochemistry	0.50
ENVS*3290	Waterborne Disease Ecology	0.50
FOOD*3230	Food Microbiology	0.75
FOOD*3240	Food Microbiology	0.50
FOOD*3260	Industrial Microbiology	0.50
FOOD*3270	Industrial Microbiology	0.50
FOOD*4400	Dairy Processing	0.50
MBG*3040	Molecular Biology of the Gene	0.50

MBG*3660	Genomics	0.50
MBG*4040	Genetics and Molecular Biology of Development	0.50
MBG*4110	Epigenetics	0.50
MBG*4240	Applied Molecular Genetics in Medicine and Biotechnology	0.50
MCB*3010	Dynamics of Cell Function and Signaling	0.50
MCB*4020	Communication in Molecular and Cellular Biology	0.50
MCB*4500	Research Project in Molecular and Cellular Biology I	1.00
MCB*4510	Research Project in Molecular and Cellular Biology	1.00
MCB*4600	Topics in Molecular and Cellular Biology	0.50
MICR*3090	Mycology	0.50
MICR*3220	Plant Microbiology	0.50
MICR*3330	World of Viruses	0.50
MICR*4010	Pathogenic Microbiology	0.50
MICR*4250	Microbiome and Immunity	0.50
MICR*4400	Viral Immunology	0.50
MICR*4430	Medical Virology	0.50
PATH*3040	Principles of Parasitology	0.50

Credit Summary

(20.00 Total Credits)

Code	Title	Credits
First year science core		4.00
Required science courses semesters 3 - 8		8.25
Restricted electives (2 in restricted electives list)		2.00
Approved Science Electives		1.75
Liberal Education Electives (1 in restricted electives list)		2.00
Free Electives - any approved electives 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.

Co-op Requirements (Honours)

This is a major within the degree: Bachelor of Science.

The Co-op program in Microbiology and Immunology is a five year program, including four work terms. Students must follow the academic work schedule as outlined below (also found on the Co-operative Education website: https://www.recruitguelph.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	Academic Semester 6	COOP*2000 Work Term II
4	COOP*3000 Work Term III	COOP*4000 Work Term IV	Off
5	Academic Semester 7	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

(22.00 Total Credits)

Code	Title	Credits
First year science required		4.00
Required science courses semesters 3 - 8		8.25
Restricted electives (2 in restricted electives list)		2.00
Approved Science Electives		1.75
Liberal Education Electives (1 in restricted electives list)		2.00
Free Electives - any approved electives for B.Sc. students		2.00
Co-op Work Terms		2.00
Total Credits		**22**

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

Code	Title	Credits
Semester 1 - Fall		
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 - Winter		
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
Summer Semester		
No academic semester or work term		
Semester 3 - Fall		
BIOC*2580	Introduction to Biochemistry	0.50

COOP*1100	Introduction to Co-operative Education	0.00
MBG*2040	Foundations in Molecular Biology and Genetics	0.50
MICR*2420	Introduction to Microbiology and Immunity	0.50
STAT*2040	Statistics I	0.50
0.50 Liberal Education electives		0.50
Semester 4 - Winter		
BIOC*3560	Structure and Function in Biochemistry	0.50
MCB*2050	Molecular Biology of the Cell	0.50
MICR*2430	Methods in Microbial Culture and Physiology	0.50
0.50 electives		0.50
0.50 Liberal Education electives		0.50
Summer Semester		
COOP*1000	Co-op Work Term I	0.50
Semester 5 - Fall		
MICR*3230	Immunology	0.50
MICR*3400	Microbial Diversity and Bioinformatics	0.50
MBG*3350	Laboratory Methods in Molecular Biology	0.75
Electives or restricted electives up to 2.75 credits		0.75
Semester 6 - Winter		
MICR*3240	Microbial Physiology and Genetics	0.50
MCB*3440	Methods in Immunology	0.75
Electives or restricted electives up to 2.75 credits		1.25
Summer Semester		
COOP*2000	Co-op Work Term II	0.50
Fall Semester		
COOP*3000	Co-op Work Term III	0.50
Winter Semester		
COOP*4000	Co-op Work Term IV	0.50
Semester 7 - Fall		
MICR*4540	Antibiotics, Resistance & Microbial Defence Mechanisms	0.50
MICR*4350	Research Methods in Microbial-Host Interactions	0.75
1.50 electives or restricted electives [1]		1.50
Semester 8 - Winter		
MICR*4250	Microbiome and Immunity	0.50
2.00 electives or restricted electives [2]		2.00

[1] Can include MCB*4500 Research Project in Molecular and Cellular Biology I

[2] Can include MCB*4510 Research Project in Molecular and Cellular Biology

Restricted Electives

1. 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/
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ENVS*3290	Waterborne Disease Ecology	0.50
FOOD*3230	Food Microbiology	0.75
FOOD*3240	Food Microbiology	0.50
FOOD*3260	Industrial Microbiology	0.50
FOOD*3270	Industrial Microbiology	0.50
FOOD*4400	Dairy Processing	0.50
MBG*3040	Molecular Biology of the Gene	0.50
MBG*3660	Genomics	0.50
MBG*4040	Genetics and Molecular Biology of Development	0.50
MBG*4110	Epigenetics	0.50
MBG*4240	Applied Molecular Genetics in Medicine and Biotechnology	0.50
MCB*3010	Dynamics of Cell Function and Signaling	0.50
MCB*4020	Communication in Molecular and Cellular Biology	0.50
MCB*4500	Research Project in Molecular and Cellular Biology I	1.00
MCB*4510	Research Project in Molecular and Cellular Biology	1.00
MCB*4600	Topics in Molecular and Cellular Biology	0.50
MICR*3090	Mycology	0.50
MICR*3220	Plant Microbiology	0.50
MICR*3330	World of Viruses	0.50
MICR*4010	Pathogenic Microbiology	0.50
MICR*4250	Microbiome and Immunity	0.50
MICR*4400	Viral Immunology	0.50
MICR*4430	Medical Virology	0.50
PATH*3040	Principles of Parasitology	0.50