

MOLECULAR BIOLOGY AND GENETICS CO-OP (MBG:C)

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.

Program Requirements

The Co-op program in Molecular Biology and Genetics 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.recrutuelph.ca/cecs/>).

Molecular Biology and Genetics 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 | COOP*4000 Work Term IV | Academic Semester 6 | Off |
| 5 | Academic Semester 7 | Academic Semester 8 | N/A |

To be eligible to continue in the Co-op program, students must meet a minimum 70% cumulative average requirement after second semester, as well as meet all work term requirements. 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 core | 4.00 |
| | Required science courses semesters 3 - 8 | 5.25 |
| | Restricted electives (#2 and 3 in restricted electives list) | 5.00 |
| | 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 |

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| Co-op Work Terms | 2.00 |
| Total Credits | 22 |

The recommended program sequence is outlined below.

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 - 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 | 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 |
| 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 |
| Summer Semester | | |
| COOP*1000 | Co-op Work Term I | 0.50 |
| Semester 5 - Fall | | |
| 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 |
| Winter Semester | | |
| COOP*2000 | Co-op Work Term II | 0.50 |
| Summer Semester | | |
| COOP*3000 | Co-op Work Term III | 0.50 |

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|-----------------------------------|-----------------------------------|------|
| Fall Semester | | |
| COOP*4000 | Co-op Work Term IV | 0.50 |
| Semester 6 - Winter | | |
| 2.50 | electives or restricted electives | 2.50 |
| Summer Semester | | |
| No academic semester or work term | | |
| Semester 7 - Fall | | |
| 2.50 | electives or restricted electives | 2.50 |
| Semester 8 - Winter | | |
| 2.50 | electives or restricted electives | 2.50 |

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| MCB*4510 | Research Project in Molecular and Cellular Biology | 1.00 |
| MCB*4600 | Topics in Molecular and Cellular Biology | 0.50 |
| MICR*3240 | Microbial Physiology and Genetics | 0.50 |
| MICR*3280 | Microbial Cell Biology | 0.50 |
| MICR*3330 | World of Viruses | 0.50 |
| MICR*4330 | Molecular Virology | 0.50 |
| STAT*2050 | Statistics II | 0.50 |

Restricted Electives

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

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. 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 |

3. Subject Area Electives 4.50 credits of which 2.00 credits must be at the 4000 level

| 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*4110 | Epigenetics | 0.50 |
| MBG*4160 | Plant Breeding | 0.50 |
| MBG*4240 | Applied Molecular Genetics in Medicine and Biotechnology | 0.50 |
| MBG*4270 | DNA Replication, Recombination and Repair | 0.50 |
| MBG*4300 | Plant Molecular Genetics | 0.50 |
| MCB*3010 | Dynamics of Cell Function and Signaling | 0.50 |
| MCB*4010 | Advanced Cell Biology | 0.50 |
| MCB*4500 | Research Project in Molecular and Cellular Biology I | 1.00 |