

**University of Guelph**  
**Learning Outcomes for the B.Sc. Honours Major in**  
**Marine & Freshwater Biology (MFB)**

The Marine and Freshwater Biology Major will allow you to study organisms living in marine and freshwater environments. You will gain firm understanding of the ecology, evolution and physiology of both vertebrate and invertebrate organisms. This program prepares students for post-graduate work in the aquatic sciences, and provides sound scientific background for students wishing to pursue careers in government service, private sector (e.g., fisheries, aquaculture, biotechnology, consulting), conservation, education and research either in government or private sectors.

**A. GENERAL SKILLS**

**1. Problem Solving & Critical Thinking**

- Critically evaluate ideas and arguments by gathering and integrating relevant information, assessing its credibility, and synthesizing evidence to formulate a position.
- Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise.
- Accurately interpret and use numerical information to evaluate and formulate position.

**2. Communication**

- Accurately and effectively communicate ideas, arguments and analyses, to a range of audiences, in graphic, oral and written form.

**3. Professional and Ethical Behaviour**

- Demonstrate personal and professional integrity by respectfully considering diverse points of view and the intellectual contribution of others, and by demonstrating commitment to honesty and equity, and awareness of sustainability, in scientific practice and society at large.
- Collaborate effectively as part of a team by demonstrating mutual respect, leadership, and an ability to set goals and manage tasks and timelines.
- Plan for professional growth and personal development within and beyond the undergraduate program.

**B. DEGREE RELATED SKILLS & KNOWLEDGE**

**1. Scientific Method**

- Apply scientific methods and processes by formulating questions, designing investigations and synthesizing data to draw conclusions and make scientifically-based decisions.
- Generate and interpret scientific data using quantitative, qualitative and analytical methodologies and techniques.

**2. Breadth & Depth of Understanding in a Particular Scientific Discipline**

- Apply the core concepts of math, physics, chemistry and biology to a chosen scientific discipline.
- Demonstrate knowledge of the ethical, economic, commercial and social implications of scientific discovery and technological innovation.

- Interpret current scientific concepts and gaps in knowledge (and methods) in light of the historical development of a chosen discipline.
- *Demonstrate an understanding of the structure, function and evolutionary relationships of the major taxonomic groups of aquatic organisms.*
- *Characterize and integrate the diversity of biological, chemical and physical features that structure marine and freshwater aquatic environments.*
- *Understand how natural and impacted aquatic systems function and interact with other systems.*

### **3. Scientific Technology & Techniques in a Scientific Discipline**

- Apply contemporary research methods, skills and techniques to conduct independent inquiry in a chosen scientific discipline.
- *Collect and assemble biological data and apply mathematical and statistical methods to the interpretation of data to address questions in aquatic biology.*
- *Demonstrate an advanced understanding and appreciation of living aquatic organisms and specimens in field and/or laboratory settings through “hands on” experience including,*
  - *Identify and/or quantify the external and internal characteristics of organisms (e.g. microscopy, physiology)*
  - *collect and handle organisms (e.g. netting, trapping)*
  - *determine the taxonomic affiliation of organisms (e.g. using morphological keys and molecular tools).*

Note: Italics indicates major specific outcomes; non-italic are BSc learning outcomes.