UNIVERSITY OF WATERLOO | FACULTY OF SCIENCE

BIOCHEMISTRY
These petri dishes, from our Biochemistry lab, hold E. coli transformed with a plasmid containing the fluorescent green protein gene found in the bioluminescent jellyfish Aequorea victoria. This is what makes them glow when under a black light.

**BIOCHEMISTRY**

[uwaterloo.ca/future/programs/biochemistry](uwaterloo.ca/future/programs/biochemistry)

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**Our bonds are strong.**

Study the chemical processes in living organisms, and utilize your foundation in chemistry to better understand biological systems.

In the past 200 years, advances in experimental techniques and instrumentation have allowed biochemists to focus on these fundamental questions: How do organisms use chemical compounds to thrive? How do organisms adjust to changes in their environment and how can our knowledge of the chemistry of life be applied to improving the human condition? To answer these questions, we study the structures of molecules, such as enzymes, and the diverse metabolic processes, such as the Kreb’s cycle, that are fundamental to life.

This multi-disciplinary program provides students with hands-on opportunities to understand the chemistry of life, with access to state-of-the-art labs and equipment. With supportive faculty, as well as an engaging and dynamic program, students who are eager to learn will excel and thrive.

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**SAMPLE CO-OP POSITIONS**

- Research and Development Formulation Technician
- Brewing Analytical Technician
- Undergraduate Research Assistant
- Quality Assurance Technician
- Aquatic Toxicity Testing Technologist

**SAMPLE CO-OP EMPLOYERS**

- Health Canada
- Maple Leaf Foods
- Apotex Inc.
- Agriculture & Agri-Food Canada
- Labatt Ontario Breweries

**POSSIBLE CAREER FIELDS/PATHS**

- Education/teaching
- Pharmaceutical industry
- Biotechnology
- Molecular research and development
- Graduate studies

Students are invited to **BIOCHEMISTRY CAREER NIGHTS** where you can see what graduates are doing after earning their degree.

[uwaterloo.ca/science](uwaterloo.ca/science)
DARA GILBERT, PHD
LECTURER

I love teaching biochemistry because it's the chemistry of life. Biochemistry fascinates me – you can approach questions in a wide variety of ways, using a myriad of different techniques.

INSTRUCTOR SPOTLIGHT

DR. DARA GILBERT

Dr. Dara Gilbert has a multi-faceted background, receiving her B.A. in Geology from UC Berkeley in 1982, and then her PhD in Biochemistry at UCLA in 1991.

It was in graduate school where she discovered her love of biochemistry. She used a variety of techniques to figure out how molecules interacted with each other. Her research has focused on the structure of DNA duplexes and how DNA interacts with drugs and proteins to control cell division. After completing her PhD she continued her research at the University of Utrecht and at Harvard Medical School.

After years of being a researcher, interacting with both undergraduate and graduate students, Dr. Gilbert realized that teaching students was incredibly rewarding. She has taught at UCLA and UCDavis, and has been with the University of Waterloo since 2005.

SPECIALIZATION

BIOTECHNOLOGY

Learn how biochemistry can be integrated into industrial processes through the use of enzymes, microorganisms, and biological processes. One of the most famous examples of biotechnology is the discovery and use of penicillin in the first half of the twentieth century.

SKILLS ATTAINED WITHIN THIS MAJOR

› Technical laboratory skills, including designing experiments and manipulating DNA
› Critical thinking
› Data analysis
› Teamwork
› Time management

Available in both the CO-OP AND REGULAR streams of study

Fulfills the academic requirements for professional membership in the CHEMICAL INSTITUTE OF CANADA

Apply via the LIFE SCIENCES entry program on OUAC, selecting BIOCHEMISTRY as the major

500+ hours of teaching and research lab experience at graduation

TRILLIONS number of chemical reactions happening in your body right now
# Course Outline

## Sample First-Term Schedule

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<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
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- **Labs**

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**Year 1 (Fall)**

- **BIOL 130/130L**: Introductory Cell Biology/Lab
- **CHEM 101**: Introduction to Biochemical Sciences
- **CHEM 121/121L**: Physical and Chemical Properties of Matter/Lab
- **ENGL/SPCOM 193**: Communication in the Sciences
- **PHYS 111**: Physics 1 or **PHYS 121**: Mechanics
- **MATH 127**: Calculus 1 for the Sciences

**Year 1 (Winter)**

- **BIOL 239**: Genetics
- **CHEM 125/125L**: Chemical Reactions, Equilibria and Kinetics/Lab
- **CHEM 140**: Introduction to Scientific Calculations
- **PHYS 112**: Physics 2 or **PHYS 122**: Waves, Electricity and Magnetism
- **MATH 128**: Calculus 2 for the Sciences

**Year 2**

- **BIOL 240/240L**: Fundamentals of Microbiology/Lab
- **BIOL 309**: Analytical Methods in Molecular Biology
- **CHEM 200**: Introduction to Laboratory Techniques
- **CHEM 220/220L**: Introductory Analytical Chemistry/Lab
- **CHEM 233/233L**: Fundamentals of Biochemistry/Lab
- **CHEM 254**: Introductory Chemical Thermodynamics
- **CHEM 264**: Organic Chemistry 1
- **CHEM 265/265L**: Organic Chemistry 2/Lab
- 1 Biology Elective (200-level)
- 1 Program Lab Elective

**Year 3**

- **BIOL 331**: Advanced Cell Biology
- **CHEM 212**: Structure and Bonding
- **CHEM 331**: Fundamentals of Metabolism 1
- **CHEM 335L**: Advanced Biochemistry Laboratory
- **CHEM 357**: Physical Biochemistry
- **STAT 202**: Introductory Statistics for Scientists or **MATH 228**: Differential Equations for Physics and Chemistry
- 3 Program Electives
- 1 Elective
- 1 Program Lab Elective

**Year 4**

- 7 Program Electives
- 3 Electives

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Course outline and schedule are subject to change at any time. Course sequence may vary for students who choose the co-op system of study.

[Link to course outline and schedule](https://mgcalendar.uwaterloo.ca/group/uwaterloo-faculty-of-science)

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**FACULTY OF SCIENCE**

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science@uwaterloo.ca

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