

UNIVERSITY OF WATERLOO | FACULTY OF SCIENCE

BIOCHEMISTRY

UNIVERSITY OF
WATERLOO



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

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 Krebs 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.

uwaterloo.ca/science

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



DARA GILBERT, PHD
LECTURER

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 UC Davis, and has been with the University of Waterloo since 2005.

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.

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



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**CO-OP AND
REGULAR**
streams of study



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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

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

SAMPLE FIRST-TERM SCHEDULE

* Labs

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Calculus 1 hr	Physics 1.5 hrs	Calculus 1 hr	Physics 1.5 hrs	Calculus 1 hr
Chemistry 1 hr		Chemistry 1 hr		Chemistry 1 hr

Science Communications 1 hr	Cell Biology 1.5 hrs	Science Communications 1 hr	Cell Biology 1.5 hrs	Science Communications 1 hr
		Chemistry 3 hrs *		Cell Biology 3 hrs *

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.

ugradcalendar.uwaterloo.ca/group/uwaterloo-faculty-of-science

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