Christian works in one of our state-of-the-art chemistry labs, where students apply what they have learned in lectures to applicable experiments.

**MEDICINAL CHEMISTRY**

[uwaterloo.ca/future/programs/medicinal-chemistry](uwaterloo.ca/future/programs/medicinal-chemistry)

---

**We’ve got great chemistry.**

The study of chemistry in regards to pharmacology, where drug design, chemical synthesis, and drug development occurs. Since the discovery, development, and distribution of Aspirin in the late 19th century, chemists have been challenged to design and synthesize pharmaceuticals to treat or prevent diseases. From antihistamines to vaccines, medicinal chemists research, design, and test new pharmaceutical agents so that humans and other biological creatures can lead better lives.

Gain valuable skills in this co-op-only program, working with researchers, hospitals, and pharmaceutical companies that are focused on drug discovery and synthesizing new medicines. The Medicinal Chemistry program at Waterloo provides you with the opportunity to learn about all aspects of drug design, with the option of focusing on a specific discipline within medicinal chemistry, be it organic synthesis, computer modelling, or biochemistry.

---

**SAMPLE CO-OP POSITIONS**

› Research and Development Technician
› Undergraduate Research Assistant
› Quality Control Assistant Analyst
› Pharmaceutical R&D
› Discovery Analyst (Pharmacology)

**SAMPLE CO-OP EMPLOYERS**

› Sanofi Aventis Group
› National Research Council Canada
› Colortech Incorporated
› The Ottawa Hospital
› University of Waterloo

**POSSIBLE CAREER FIELDS/PATHS**

› Pharmacology
› Industrial research and development
› Experimental researcher
› Government agencies
› Drug development and formulation

**PROFESSIONAL MEMBERSHIP**

Member of the Chemical Institute of Canada (MCIC) requirements are fulfilled with a degree in this major.
CHOOSING THE RIGHT PROGRAM FOR YOUR GOALS

Drug therapy can be divided into two knowledge groups:

MEDICINAL CHEMISTRY
› The design, organization, and development of chemical compounds for use as drugs. It is at the interface of a variety of fields including synthetic organic chemistry, biochemistry, computational chemistry, and pharmacology.

PHARMACY
› The study of drug interaction with living systems, as well as the importance of patient care, communication, and comprehensive medication management.

Although these two disciplines overlap, please note that we do not recommend the Medicinal Chemistry program as a path to the Doctor of Pharmacy degree program. Medicinal Chemistry discovers and develops medications, Pharmacy ensures the safety and effectiveness of the medication with patients.

DISCOVERY NEVER ENDS

CHEM 383 MEDICINAL CHEMISTRY
This course focuses on the drug discovery process and drug synthesis – providing students with a comprehensive understanding of enzymes, receptors, hit and lead discovery, metabolism, and other topics that will be of interest to those wanting to work in the pharmaceutical industry.

CHEM 382L ADVANCED ORGANIC SYNTHESIS LABORATORY
This laboratory course was specifically designed for Medicinal Chemistry students. Students will learn advanced synthetic techniques and analytical procedures that prepare them for research positions in industry or academia. Throughout the term, students will devise synthetic methods and have opportunities to test their methods in the laboratory.

SKILLS ATTAINED WITHIN THIS MAJOR
› Synthetic organic chemistry skills
› Ability to design and execute on scientific experiments safely and accurately
› Analytical skills needed to identify organic compounds
› Ability to analyze scientific and technical data
› Problem solving, critical thinking, and time management skills

FLIPPING THE LABS
Advanced and highly specialized industry-level laboratories await those who choose Medicinal Chemistry. They are not just state-of-the-art, but the teaching methods are forward-thinking as well – challenging students to design their own experiments, to learn from their failures, and become more confident researchers.

A NATURAL SCIENCE
Many pharmaceuticals come from natural sources, like plants. The rosy periwinkle plant, found in Madagascar, is used to cure leukemia in some patients.

Available in the CO-OP stream of study only

Apply via the PHYSICAL SCIENCES entry program on OUAC, selecting MEDICINAL CHEMISTRY as the major

5% of new drugs get past the clinical trial phase

1,000+ people needed, along with about 12-15 years, to bring a new drug from concept to market
# COURSE OUTLINE

## SAMPLE FIRST-TERM SCHEDULE

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Science Communications</strong> 3 hrs</td>
<td><strong>Chemistry</strong> 3 hrs</td>
<td><strong>Physics</strong> 1 hr</td>
<td><strong>Chemistry</strong> 1 hr</td>
<td><strong>Calculus</strong> 1 hr</td>
</tr>
<tr>
<td><strong>Physics</strong> 1 hr</td>
<td><strong>Chemistry</strong> 1 hr</td>
<td><strong>Chemistry</strong> 1 hr</td>
<td><strong>Calculus</strong> 1 hr</td>
<td><strong>Biology</strong> 1 hr</td>
</tr>
<tr>
<td><strong>Biology</strong> 1 hr</td>
<td><strong>Biology</strong> 1 hr</td>
<td><strong>Physics</strong> 3 hrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Course outline and schedule are subject to change at any time.

[ugradcalendar.uwaterloo.ca/group/uwaterloo-faculty-of-science](ugradcalendar.uwaterloo.ca/group/uwaterloo-faculty-of-science)