

SCIENCE



uwo.ca/sci

Welcome to **SCIENCE** and Basic Medical Sciences



Western
Science



Table of Contents

SCIENCE PROGRAMS

Computer and Mathematical Sciences

Computer Science	6
The School of Mathematical and Statistical Sciences	10

Integrated Science	12
--------------------------	----

Physical Sciences

Chemistry	16
Physics & Astronomy	18

Life Sciences

Biology	22
Basic Medical Sciences	26

Sustainability Sciences

Earth Sciences	30
Environmental Science	32

ADMISSIONS

Requirements	34
Academic Paths	35
Biology, Health Sciences, Medical Sciences — What's the Difference?	36
Modules at a Glance	38

EXPERIENTIAL LEARNING

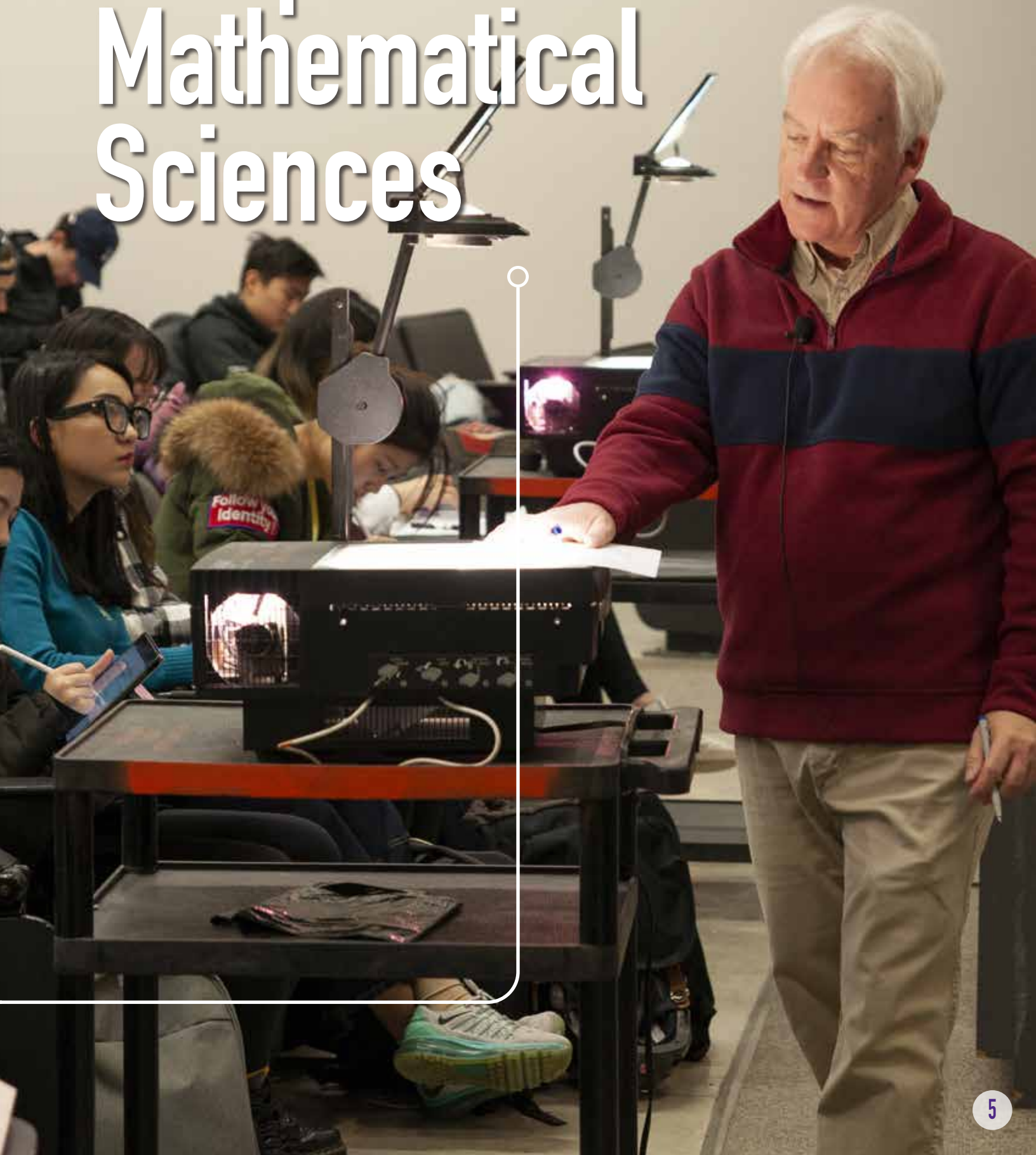
Live the Science	42
What can you do with a Science Degree?	44

Western  Science

PROGRAMS



Computer and Mathematical Sciences



Computer Science

INFORMATION SYSTEMS

Are you passionate about business but need an edge in a highly competitive marketplace? Do you want to learn how technology can be applied to solve critical business problems and create exciting new opportunities? Information Systems is for you! This program allows you to explore computing in a practical setting, preparing you to be the leader who knows how to make technology work for you and your organization, or the technical expert who understands the world of business. This is a win-win degree!

MEDICAL HEALTH INFORMATICS

The cure is out there – we just have to find it! Using computing to collect, store and analyze medical data is rapidly accelerating the way we solve medical mysteries. The medical professionals of tomorrow must have the right tools and expertise to help them manage the overwhelming volume of data. A background in Computer Science, along with an understanding of medical data, unlocks the potential to impact public health and influence the future of medicine!

GAME DEVELOPMENT

Games are serious business. In fact, video games generate more revenue each year than music, film, television, and books. Making a successful video game is not child's play either. Computing, naturally, plays a big role from programming, to graphics, to audio, to physical simulation, to online support, and more. Computer Science at Western has what it takes to prepare you for this exciting, challenging, and creative field, and has been ranked in the top 50 universities in the world to study game development for three years running – something you won't find anywhere else in Canada!





100%

of Computer Science students are employed within 24 months post-graduation.

Future game developers benefit from courses set up as game development studios. They take on leadership roles in simulated consultant firms, take on project management responsibilities and assume ownership of technical deliverables.


Computer Science grants degrees that are accredited by the Computer Science Accreditation Council and the Canadian Information Processing Society, facilitating subsequent professional certification as an Information Systems Professional or an Information Technology Certified Professional.



WHAT YOU'LL LEARN

- Design and build software
- Solve computing problems
 - Storing information in databases
 - Sending data over networks
 - New solutions to cyber-security
- Address challenges in:
 - Big Data
 - Game Development
 - Social and Mobile Computing
 - Medical Imaging
 - Bioinformatics





The School of Mathematical & Statistical Sciences

The School of Mathematical and Statistical Sciences represents the collaborative efforts of the Departments of Applied Mathematics, Mathematics and Statistical and Actuarial Sciences. Each of these departments offers training in the mathematical and statistical science that prepares our students for pivotal roles in industry, government and academia.

TOP 20 Modelling against over 2,000 teams worldwide, Western is consistently in the top 20 and twice have been world champions of the COMAP Mathematical Contest.

100% of our students have smaller and more specialized classes in their third and fourth year of our programs.

Actuarial Science scholarships are awarded yearly that provide for an aggregate payout of up to \$45,000 annually to undergraduate students.

FINANCIAL MODELLING

Are you great at seeing patterns, solving problems and strategizing? Studying financial modelling may be right for you. At Western, Financial Modelling will teach you to forecast, quantify, hedge, and manage financial risk like rising interest rates when it's time to renew a home mortgage, a stock market crash requiring a delayed retirement or a dip in share value impacting acquisition negotiations.

ACTUARIAL SCIENCE

Actuaries are the brains of insurance companies, which create and manage financial products designed to mitigate the impact of life challenges including premature death, major illness, disability, car crash, or property damage due to wind, fire, or flood. At Western, we train you to become a sophisticated business professional who assesses the probability and impact of these to design situations which mitigate personal challenges.

Four annual TD Women in Data Analytics Bursaries of \$5,000 are awarded to encourage greater gender equity and provide meaningful financial support to women entering this discipline.

DATA SCIENCE

There is more data being produced in all facets of society than ever before. If you are interested in learning how to manage, visualize, model and transform data into solutions to existing challenges or into new and commercializable products, data science is the learning path for you.

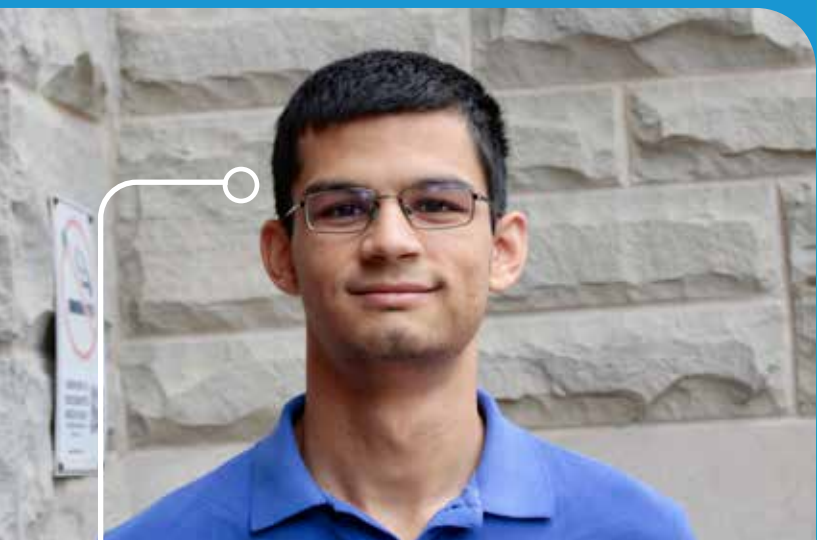
SCIENTIFIC COMPUTING AND NUMERICAL METHODS

Computation is now fundamental to scientific discovery and engineering design alike. The Boeing 777 Dreamliner, for instance, was conceived mostly on a computer, complete with detailed calculations of aerodynamic and control properties. Drugs can also be designed on computers as can modern materials. To become an expert in the algorithms behind these innovations, take our Scientific Computing and Numerical Methods program.



WHAT YOU'LL LEARN

- Develop mathematical and stochastic models for phenomena occurring in business, engineering, medicine and government using modern, computer-based, statistical methods
- Apply advanced mathematical, computational and statistical techniques to problems arising in modern financial markets
- Apply existing and develop new models and methods used in the management of risk associated with adverse life events like premature death and disability
- Game and Number Theory
- Collect, analyze and interpret data
- Computational materials science



“My favourite science course was Rings and Modules as it was one of my first algebra courses, and it helped me to appreciate the importance of structure in mathematics.”

AMAR

BSc Mathematics & Applied Mathematics

APPLIED MATHEMATICS

Mathematics is the language of science. The flow of air over a wing, the way birds flock and the mechanism by which organisms evolve all follow mathematical laws. If you want to contribute to the next generation of scientific breakthroughs, then modelling scientific phenomena with math and solving the resulting equations with our Applied Math community may be your path to success.

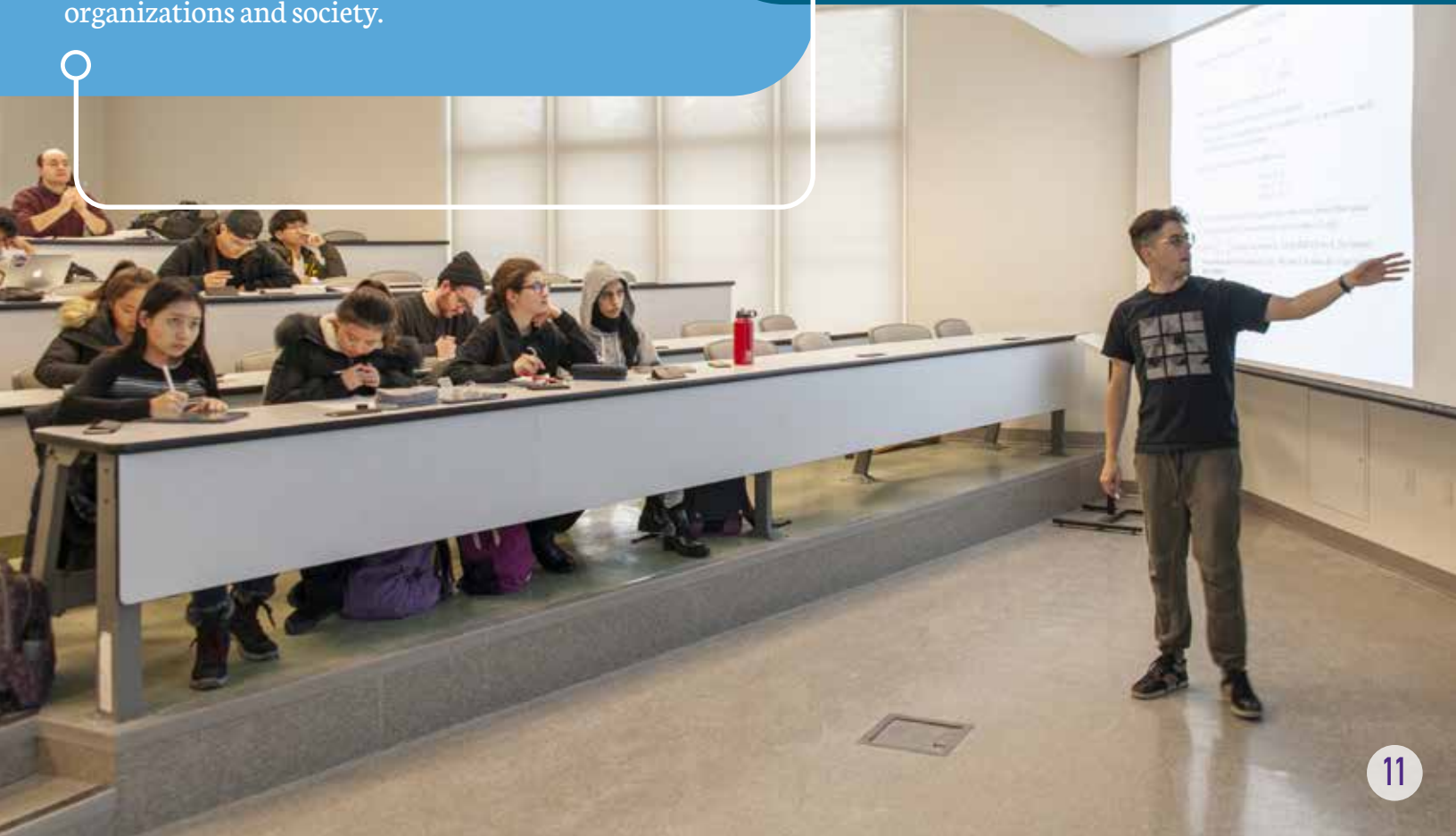
MATHEMATICS

Often known as 'The Queen of the Sciences,' Mathematics is the discipline of pure abstract thought. A degree in Mathematics allows you to grapple with questions like how can space be curved or what is the best way to pack 26-dimensional spheres together? A profound background in mathematics is fundamental to the practical field of cryptography and provides deep training for any profession in which logical thinking is at a premium.

In their third year, students can apply for the RBC Scholarship in Data Science to help support them as they acquire solid technical training and explore the social impact and ethical use of big data and AI on individuals, organizations and society.



Western is accredited by the Statistical Society of Canada and students completing a degree in Statistics may receive accreditation as an Associate Statistician.



Integrated Science



100% of WISc students undertake a cross-disciplinary research project.



Do you love science? The Integrated Science program at Western (WISc) is a four-year honors program that combines the focused coursework of a traditional honors degree with an innovative and diverse set of Integrated Science courses that explore the interdisciplinary nature of science. Whether it's climate change, renewable energy or antibiotic resistance, today's most pressing problems are fundamentally

interdisciplinary. The ability to address these challenges requires that you have both discipline-specific expertise and a broader perspective, allowing you to work/communicate well with scientists from other disciplines.

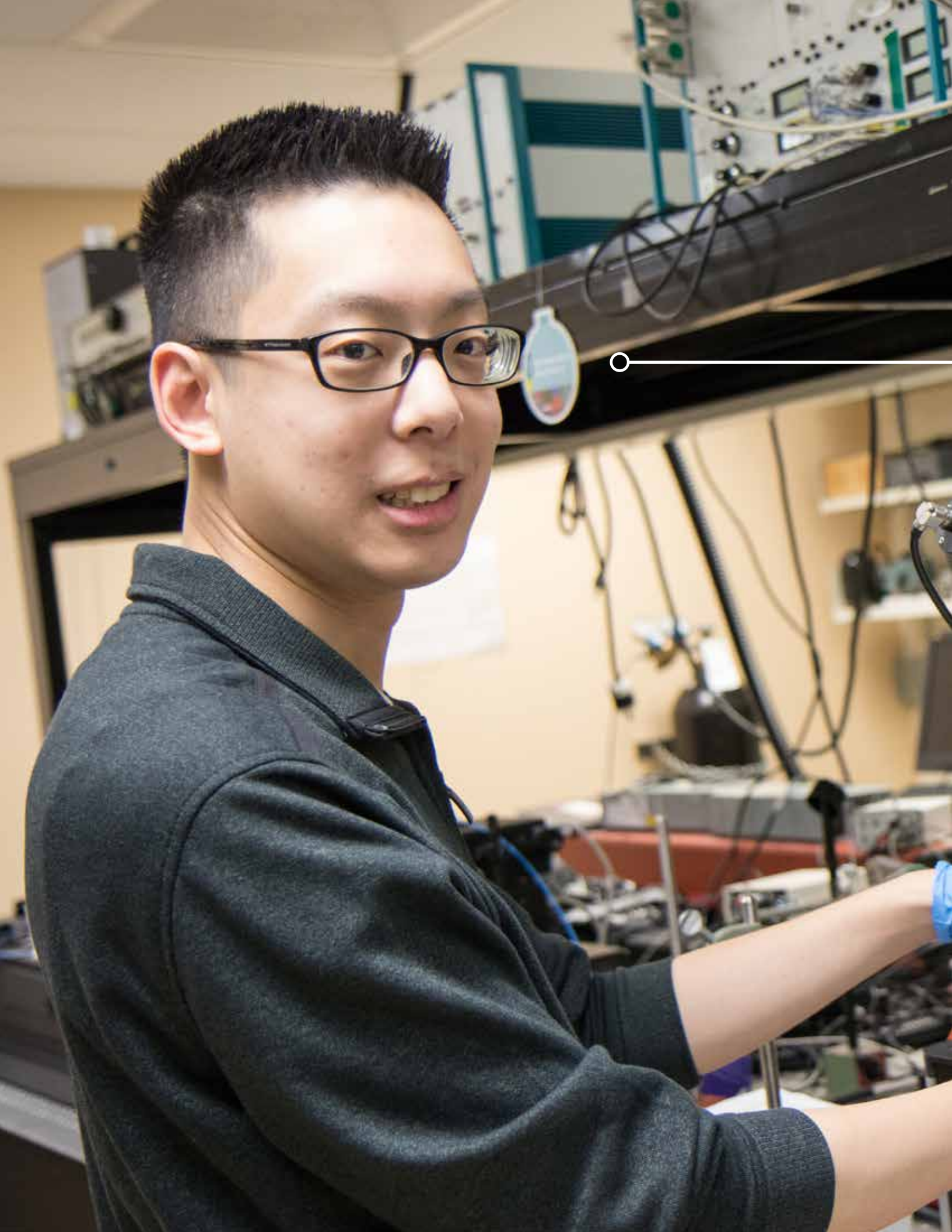
○ High-tech science facility, with 24/7 availability, designed exclusively for the hands-on, collaborative learning of WISc students.

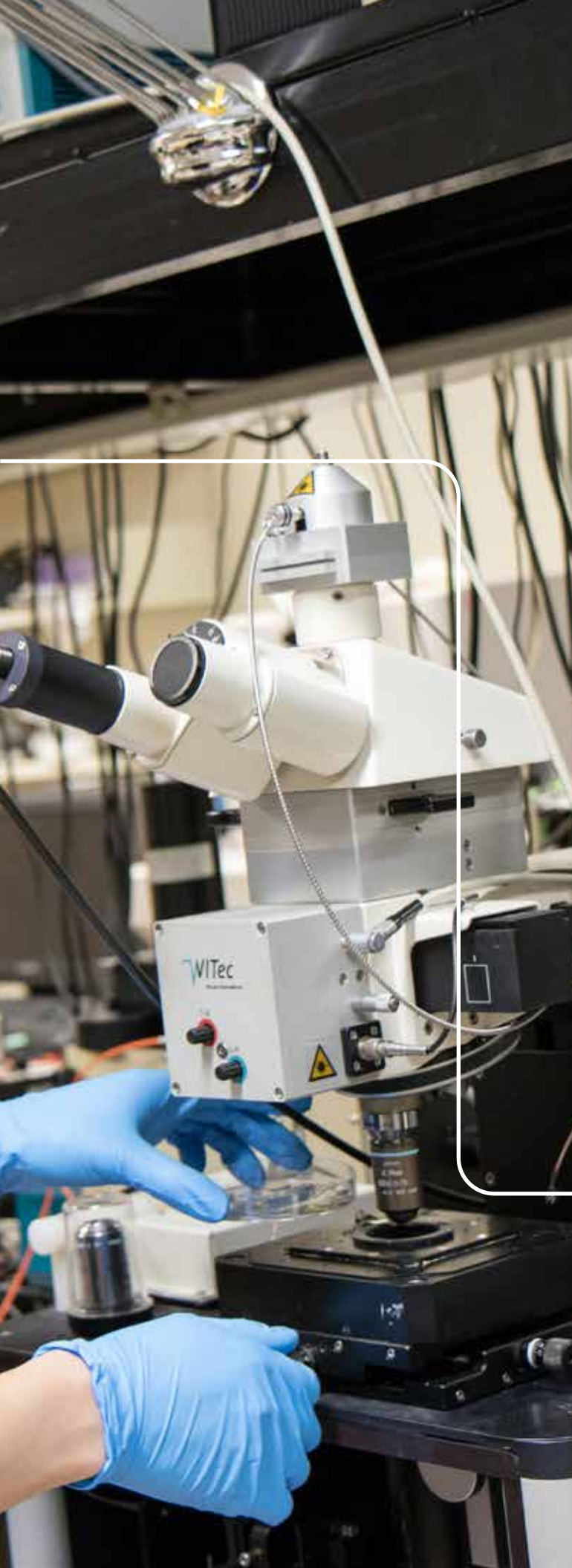
The small-class environment and collaborative structure of WISc will refine your critical-thinking, problem-solving, teamwork, and leadership skills, while learning the fundamentals of a broad range of science disciplines. If you are interested in learning, for example, the role of coding to further develop an understanding of protein evolution or how chemistry is critical to exploring the geology of a distant planet, if you love hands-on experimentation and enjoy being an active member of a small community, then Integrated Science is the right program for you.

A maximum of 60 participants per cohort means instructors can focus on the individual growth of students while encouraging collaborative peer learning.



Hear from WISc students at
uwo.ca/sci/WISc/video





Physical Sciences

Chemistry

SYNTHESIS

Do you like baking? Mixing ingredients together to get new substances? Trade in your spoons, measuring cups and pots for spatulas, graduated cylinders and flasks and experience baking, aka 'synthesis' at the molecular level! Like baking, chemical synthesis requires creativity, devising new strategies for making exciting new molecules. But no tasting here; use a variety of wavelengths of light from X-rays to radiowaves which can interact with your newly formed substances and give you clues about what you have made. If you like solving puzzles, you will enjoy piecing together the information provided by interactions of light with matter to determine the structures of your new creations!

MATERIALS

Advanced materials, like carbon nanotubes have revolutionized the hockey stick. New polymers have been designed to transport life-saving medication to the heart of a tumour and then degrade! These person-made materials have to be made, characterized and their properties understood before they can be applied. Explore the chemistry of materials and be part of the development of innovative substances for sports, medicine, alternative energy and the environment.

BIOCHEMISTRY

What is a double-helix? Why am I allergic to peanuts? What is cholesterol and why is it only in animals? Why can't I eat a tree? Understanding the chemistry of living systems helps us to understand life, what keeps us alive and what keeps us healthy. If you are interested in devising ways to solve problems when the chemistry goes wrong, as in cancer and other related diseases and chronic health conditions, consider biochemistry at Western.



WHAT YOU'LL LEARN

- Tools and techniques of chemistry
- Numeracy, deductive and inductive skills
- New reaction pathways and compounds
- Interpretation of experimental results

Our first-year labs are flooded with natural light, offer large workstations designed to support learning collaborations and are fitted with computer-controlled modular equipment to simulate an authentic lab environment found in government and industry.



"The teaching assistants and professors are exceptional and reach out to students to actively engage with them. I'm very

grateful to Western for giving me the opportunity to expand my knowledge of Chemistry and to support me along the way.

CLAIRE
BSc Chemistry

First-year Chemistry students are paired with senior students in the fall term to engage in *Explore Chemistry* activities like meeting industry guest speakers and shadowing a fourth-year student engaged in their honors thesis research in the lab.



100% of Chemistry students in a 4-year degree program will do hands-on research with a faculty member's research group.

Physics & Astronomy



WHAT YOU'LL LEARN

- Tools and techniques of modern high technology
- Computer simulation
- Experimental design
- Data analysis
- Logical reasoning
- Mathematics

100% of Physics & Astronomy students get research experience with a faculty member.

ASTROPHYSICS

Are you interested in understanding the universe and our place in it? Consider studying astrophysics at Western! Through the interaction of light and matter, you can access the universe through observatories around the world and in space. Astrophysicists at Western will help you explore black holes, exoplanets, meteors, the atmospheres of Earth and other planets, the dust and gas between the stars, and the evolution of galaxies over cosmic time.

MEDICAL PHYSICS

Do you really love physics *and* you're interested in contributing to modern medicine? Medical Physics students at Western have the opportunity to develop tools for cancer treatments, participate in the development of the next generation of magnetic resonance imaging scanners, work on blood flow imaging to diagnose heart disease, or analyze complex brain maps. Join the team of medical physicists at Western to investigate these topics and more.

PHYSICS OF MATERIALS

Do you wonder how our technology works? Physics connects the microscopic rules of quantum mechanics to the macroscopic properties of modern materials. Participate in developing new types of solar cells, studying the interface between cells and matrix material, or building lasers based on quantum dots. Our experimental physicists are looking for students to contribute to these and other projects.



100% of our students have small, specialized classes in third and fourth year.

Students in all years of physics and astronomy collaborate through a seminar course to learn solid communications and scientific translation skills.



“The fantastic professors here at Western were pivotal to my growth as a physicist. Their mentorship and support has allowed me to grow into a physicist who is naturally curious about the mathematical framework of the Universe. Thus am I able to actively apply my knowledge to solve real-world problems.”

ADRIAN
BSc Astrophysics







Life Sciences

Biology

BIODIVERSITY & CONSERVATION

A recent study puts the total number of species on Earth at close to 9 million. However, what is more surprising is that scientists estimate that over 80% of those species have yet to be discovered! We are at a time when there is a strong need for better scientific understanding of global biological diversity, the threats to its existence, and development and implementation of methods for its conservation. Addressing these issues requires individuals with a solid grounding in systematics, genetics, ecology, and field biology, which provide a foundation for advanced courses and hands-on experiences in conservation and restoration.

GENETICS

The most important alphabet on Earth is its smallest — the four letter code of DNA. How hereditary information is conveyed using such a small code began to be understood by studying organisms in which something was wrong (mutants). Today this traditional approach is complemented by molecular genetics, which takes advantage of a wealth of DNA sequence information as well as technologies that allows one to easily disrupt and replace specific genes. As a student, you can take a range of courses focused on gene structure, function and regulation that are taught using a range of animal, plant and microbial systems. Courses in genetic engineering, developmental genetics, behavioral genetics, and evolutionary genetics convey the importance of the smallest alphabet on all aspects of life.

“I came to Western knowing I liked biology but the highlight of my undergraduate degree was becoming involved in research and by my final year, I discovered my passion for stem cell research!”

ALEXANDRA
BSc Biology

ANIMAL BEHAVIOR

Scientists, as well as philosophers, have always asked why animals and people behave as they do. Behaviour involves a wide range of traits from animal communication, foraging, sexual behaviour, social organization, and cognition. Research into behavior ranges from analyses involving hormone levels and gene expression through to addressing broad questions such as the functions that behaviour serves, how behaviour develops and how specific behaviours have evolved. This area of study draws on expertise from both the Department of Biology as well as the Department of Psychology.



WHAT YOU'LL LEARN

- Critical Thinking
- Communications Skills
- Experimental Design
- Data Analysis
- Assess Ecosystems
- Identify Flora and Fauna
- Implement tools of molecular biology and microscopy
- Use analytical instrumentation

100%

of Biology students
get hands-on lab
experience in
second-year.





As an undergraduate student in biology, you will have the opportunity to carry out a research project in an exotic location and get credit for it. Examples of recent offerings include: Rainforests and Reef Biology in Costa Rica; Tropical Marine Biology in Belize; Forest Ecology in the Adirondacks; Field Ornithology in Virginia and Tropical Biodiversity in Ecuador.



USEFUL LINKS

Science and Basic Medical Science
Academic Counselling: uwo.ca/sci/counselling

Indigenous Services: indigenous.uwo.ca
Accommodation for Alternately Abled
Learners: sdc.uwo.ca/ssd/academic_accommodation/index.html

Science Career Services: uwo.ca/sci/undergraduate/careers_and_internships/index.html



WHAT YOU'LL LEARN

As a Medical Sciences 1 and 2 student, you are registered in the Faculty of Science and develop a foundation in:

- ➔ Biology
- ➔ Chemistry
- ➔ Physics
- ➔ Genetics
- ➔ Cell biology
- ➔ Math and Statistics

You are able to perform novel research in Year 4 under the supervision of a faculty member in 21 different discipline-specific Honors Specialization modules.



Basic Medical Sciences

...EN ROUTE TO THE BACHELOR OF MEDICAL SCIENCES (BMSc) PROGRAM

The Basic Medical Sciences look at the molecular, cellular and systems organization of the human body and the biological mechanisms it uses to adapt to environmental changes and disease. The Bachelor of Medical Sciences Program that leads to the four-year BMSc degree, is offered jointly by the Faculty of Science and the Schulich School of Medicine & Dentistry. It is designed for students interested in advanced study of one or more of the basic medical sciences. This joint program focuses on the application of science to the diagnosis, prevention, and treatment of human disease.



“My favourite science course is Cell Biology! The content of this course is fascinating, learning about such intricate, yet well

organized mechanisms and processes taking place in our bodies at the microscopic level never fails to blow my mind. I come to class and learn something entirely new every time, making this course truly one of my favourites!”

DURSA

2nd year Neuroscience student



ANATOMY AND CELL BIOLOGY

(offers modules in Medical Cell Biology)

Medical Cell Biology is the study of the cell, the basic building block of life. In Medical Cell Biology, you will learn how cells work together to form tissues, organs and the human body. You will also learn what happens when cells malfunction leading to diseases such as cancer.

BIOCHEMISTRY

Personalized medicine informed by genome analysis. Designer organisms that produce valuable medications or clean up environmental toxins. Rational drug discovery to correct specific cellular malfunctions. Crucial to all such advances in biotechnology is an understanding of how life works at the molecular level. Join us in Biochemistry at Western as we explore the intricate interplay among the molecules that sustain life.



EPIDEMIOLOGY AND BIOSTATISTICS

Are you interested in understanding why some people get sick and others do not? Consider studying Epidemiology at Western! Epidemiologists investigate why rates of disease vary by person, place and time. As such, epidemiology is the science which underlies public health practice. You will learn how to identify causes of disease, and how to evaluate new strategies for preventing people from becoming ill and for treating people in whom disease develops.

INTERDISCIPLINARY MEDICAL SCIENCES

Interdisciplinary research is an emerging field in the medical sciences! Come join the interdisciplinary medical sciences module, where we identify and study a disease that is relevant to the health and well-being of Canadians. We emphasize the value of studying a disease from multiple disciplines to advance medical science research.

MEDICAL BIOPHYSICS

Are you interested in both biology and physics, and in using these to improve human health? Then Medical Biophysics is the program for you! Through small highly interactive classes and faculty-supervised research projects, you will learn to apply mathematics, biology, chemistry and physics to areas such as medical imaging (CT, MRI, PET, US), cancer radiation therapy, joint and tissue biomechanics, and cardiovascular and lung disease.

MEDICAL HEALTH INFORMATICS

Medical Health Informatics is more simply – the study of computers and information technologies in the health system. How can we use technology to improve diagnosis of disease through digital imaging, to treat disease through innovative mobile health apps, to prevent disease through calculating risk factors in huge data sets, or monitor and record health and disease within an electronic health record? Combine your interest in studying the human body with skills to develop, understand and evaluate innovative technology.

MICROBIOLOGY AND IMMUNOLOGY

How do humans survive when we are constantly exposed to microbes outside and inside our body? Microbiology & Immunology teaches you how our immune system responds to microbial infections and cancer; how some microbes cause global infectious diseases and epidemics while others benefit our health, industry and the environment; why we get vaccines, autoimmune diseases, allergies, and so much more.

NEUROSCIENCE

The human brain is the part of the body that makes each of us unique. It holds our thoughts, experiences and emotions and allows us to adapt to our changing world. In Neuroscience, you will learn the mysteries of the brain and how brain injury can lead to disorders such as Alzheimer's, Autism and Depression.

In Year 3, you will transition to courses offered by the Basic Medical Science departments in the Schulich School of Medicine & Dentistry to learn and understand the interrelationship between the basic and clinical medical sciences and to explore one or more of these disciplines in depth.



RESEARCH

In addition to the Year 4 research project, you can undertake other opportunities to acquire state of the art research skills. Enhance your abilities and discover the value of a career in biomedical research through summer opportunities such as NSERC USRA after Year 3. If you are interested in experiencing the culture of a developing nation while broadening your research skills, the Department of Microbiology and Immunology also offers unique research experiences on the African continent as well as fellowships for second- and third-year students to perform independent research over the summer.

ONE HEALTH

Did you know that more than 60% of all known human diseases are passed from other species? Degradation of our environment also creates favorable settings for the emergence of new diseases and the expansion of existing ones. One Health is an exciting new interdisciplinary field that aims to understand how humans, the environment, and animals are interconnected and interdependent for health. One Health links many different types of scientists and scientific approaches – all the way from basic and environmental science to biomedical science to population health to policy and governance – with the goal of improving our health.

PATHOLOGY

Pathology is the study of disease. Understanding how and why a disease develops is the foundation of Pathology. Cancer, asthma, and heart attacks are just some of many disease processes studied in pathology. This multidisciplinary field draws from basic sciences of anatomy, cell biology, genetics, immunology, and physiology to study the cause, origin and nature of diseases. Deciphering the mechanism of diseases have led to major advances in medical approaches, such as vaccines against infectious diseases, organ transplantation, safe blood transfusion, genetics and forensics. Come learn about cutting-edge Pathology research.

PHYSIOLOGY AND PHARMACOLOGY

Want to learn about how the human body works and how to treat diseases with drugs? If so, study physiology and pharmacology at Western! Explore how your body works and how to treat it when things go wrong by learning about the body's main organs...brain, heart, kidney, liver and more.



“My favourite science course is Biology 1002B. I acquired an understanding of molecular biology while also refining my learning skills.

Concepts covered such as gene transcription and translation, cellular transportation, and biotechnology sparked my interest in pursuing scientific research while learning strategies like as mental imagery, analogies, and conceptual connections really contributed to my success in this course and others that I have since completed.”

MUTIAN

1st year BMSc student





Sustainability Sciences





Earth Sciences



WHAT YOU'LL LEARN

- The tectonic mechanisms that create earthquakes and volcanic eruptions
- The processes that occur within the planet, that shape its surface, and that control its atmosphere
- The origin, occurrence, extraction and conservation of Earth's natural resources, including minerals, fossil fuels, soils and water
- The role of the Earth within the Solar System and the history of life on Earth

More than **90%** of students will receive research experience with a faculty member through their fourth-year thesis project.

ENVIRONMENTAL GEOSCIENCE

Human activities affect, and are affected by, complex interactions of Earth: the biosphere, atmosphere, hydrosphere and Earth materials. Are you interested in developing sustainable solutions to environmental problems, from local water/air/soil pollution to global climate change, or dealing with natural hazards, from local civil engineering problems to large-scale catastrophes? Then you will need the solid understanding of the dynamic relationships between natural processes on and within our planet that the Environmental Geoscience at Western provides on your path to becoming a professional geoscientist!

GEOLOGY

Geology studies the processes that shape the Earth's surface features, interior structure and composition. At Western, multidisciplinary skills are developed in field, laboratory, theory, and computation. This broad approach will give you the skills to meet emerging challenges in the responsible development of new resources and mitigation of natural hazards like earthquakes, volcanoes, and landslides.

GEOPHYSICS

Explore how Earth's magnetic field protects us from being sautéed by the Sun's harmful radiation. Consider how birds use the magnetic field to navigate during migration. Learn about why North America is moving away from Europe at 5 cm per year. Dig into the resources found underground to produce innovative products like cell phones. Geophysics at Western offers a great opportunity to study and unlock the secrets of the interior of the Earth and other planets and prepare you for an exciting future in exploration.

PLANETARY SCIENCE

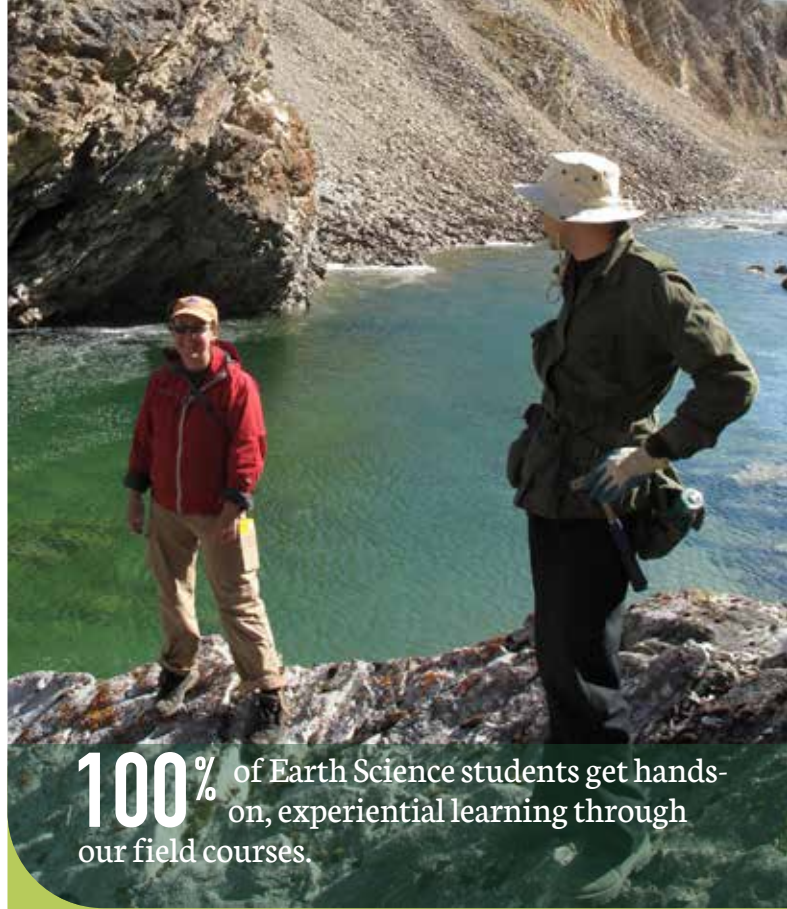
Are you interested in exploring other worlds? Consider planetary science as your path to finding out how new and ongoing space missions to planets, moons and asteroids are revolutionizing our view of the formation and evolution of the solar system. Learn how the Earth became a habitable world, and why other planets took radically different pathways. Explore worlds with ice mountains, hydrocarbon lakes, and subterranean oceans. Studying planetary science at Western will give you a new way of looking at the universe.



"I got hired in first-year as a field assistant for a graduate student in Planetary Science and was able to work out in the field for multiple weeks at a time."

KEELAN

4th year Honours Geology for Professional Registration



100% of Earth Science students get hands-on, experiential learning through our field courses.

Earth Science students can choose to pursue modules in Geology, Geophysics and Environmental Geoscience designed to help them meet the professional registration qualifications to become a licensed geoscientist after graduation.

100% of Earth Science students have small, specialized classes in third or fourth year.



Environmental Sciences

Rebecca traveled to the remote Uinta Mountains in Utah to collect samples for her fourth-year thesis project which involved using stable isotope science to characterize sources of organic matter to lake sediments.

What Is Environmental Science at Western?

Environmental issues ranging from biodiversity loss, access to safe and clean water, energy, renewable resources, to ecosystem health, natural disasters, and sustainable business practices are explored in the Environmental Science program at Western.

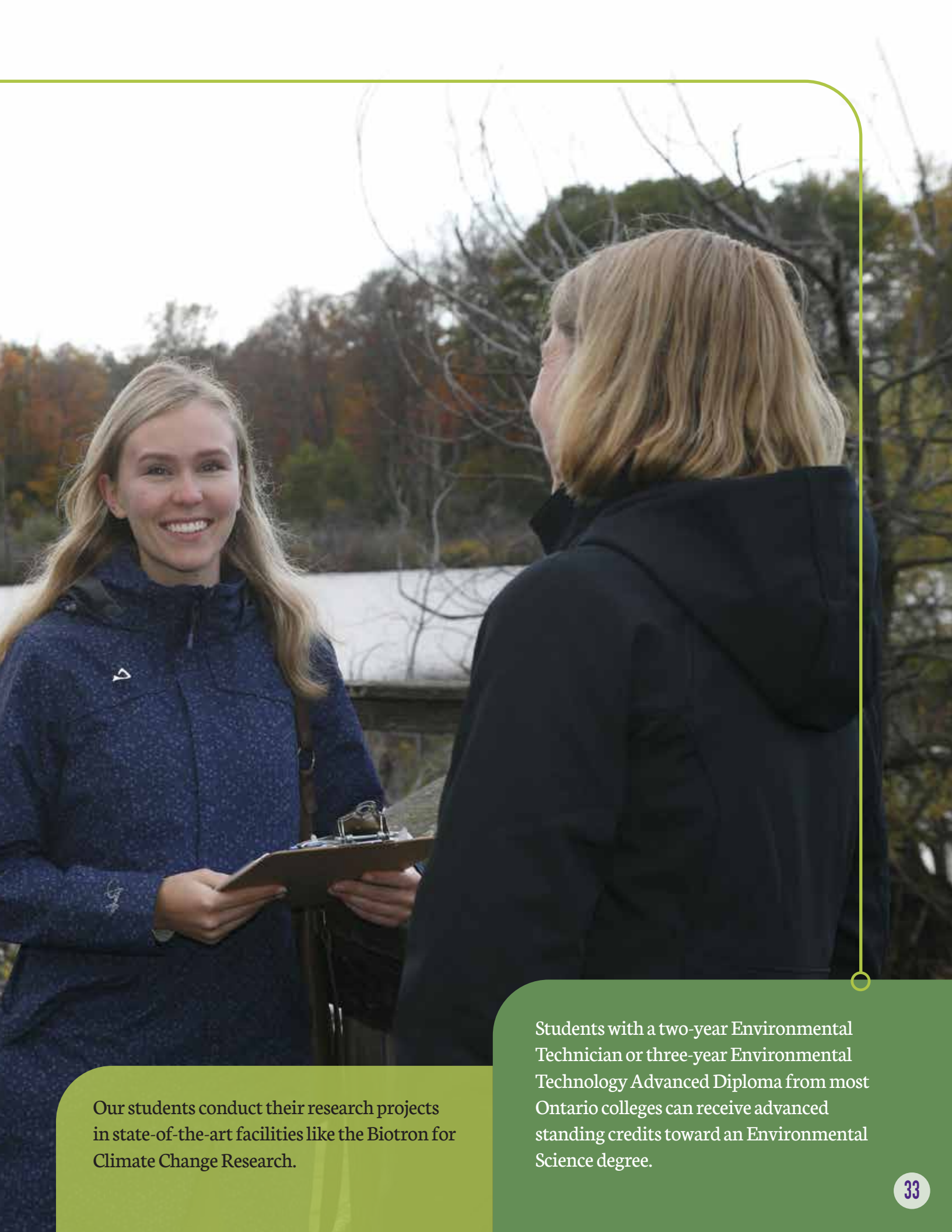
Our students learn to communicate environmental science across disciplines and to apply knowledge from these different fields to develop solutions to real-world issues. Building on a solid core of science – including content in biology, chemistry, mathematics, earth sciences, geographic information science and physical geography – Environmental Science students have the added benefit of access to training in other disciplines ranging from anthropology, business, and economics, to First Nations Studies, Philosophy, political science, human geography and sociology.

100% of our students have the opportunity to participate in a paid eight-16-month Science Internship with government or industry in environmental policy, management and science.



WHAT YOU'LL LEARN

- Process environmental issues
- Biodiversity loss
- Access to safe and clean water
- Energy
- Renewable resources
- Ecosystem health
- Natural disasters
- Sustainable business practices



Our students conduct their research projects in state-of-the-art facilities like the Biotron for Climate Change Research.

Students with a two-year Environmental Technician or three-year Environmental Technology Advanced Diploma from most Ontario colleges can receive advanced standing credits toward an Environmental Science degree.

Admission



Western
Science

ADMISSION REQUIREMENTS

For Science (OUAC code: ES) Integrated Science (OUAC Code: ES)

Mandatory

English (ENG4U)
Calculus and Vectors (MCV4U)

Plus Two Courses From:

Advanced Functions (MHF4U)
Biology (SBI4U)
Chemistry (SCH4U)
Computer and Information Science (ICS4U)
Earth and Space Sciences (SES4U)
Math and Data Management (MDM4U)
Physics (SPH4U)

NOTE: First-year Biology and Chemistry courses require Grade 12 Biology (SBI4U) and Grade 12 Chemistry (SCH4U), respectively. First-year Biology and Chemistry courses are required for all modules offered by the Department of Biology and some modules offered by the Department of Chemistry and other Science departments.

Integrated Science students must complete Grade 12 Chemistry (SCH4U).

For Medical Sciences (OUAC code: ESM)

English (ENG4U)
Calculus and Vectors (MCV4U)

Biology (SBI4U)
Chemistry (SCH4U)

NOTE: Although Western offers first-year physics courses that do not require high school physics as a prerequisite, it is strongly recommended that students complete Grade 12 Physics (SPH4U).

For more information:

WesternScience.ca/Admission
westerncalendar.uwo.ca



Approximately **6,000**
undergraduate students
are engaged in Science
and Basic Medical Science
discovery at Western.

Once You Have Been Granted Admission to Western

Assistance with course selection is available during Summer Academic Orientation and is highly recommended. This service provides you the opportunity to discuss your courses, attend learning skills sessions and a student panel, take a tour of the campus and residences, set up a timetable and a Western email account, and register for your courses.



For more information: **welcome.uwo.ca**

Academic Paths

Western's Modular Degree Structure — Giving You the Power of Choice

A module is a collection of courses that define an area of concentration. The number of courses included in the module is defined by the amount of specialization in the topic. Western's modular degree structure gives you the opportunity to combine various subjects from different departments and faculties. The specific courses included in each module are determined by the Department.

YOU HAVE THOUSANDS OF OPTIONS

Western's modular system allows you to combine a Science module with a module in another Science or non-Science discipline to tailor your degree to fit your interests and aspirations. For example, if you are planning to complete a four-year Honors Bachelor Degree, you can pursue an Honors Specialization in Earth Sciences, combined with a Minor in Philosophy. An honors degree can also be constructed from two different Major modules, either both in Science or one in Science plus a non-Science. At Western, there are literally thousands of possible combinations of modules.

DUAL DEGREE PROGRAMS

There are cases where reaching a career goal requires more than one degree or certificate. Western offers several combined and concurrent programs so you can earn two degrees in less time, extend the scope of your marketable skills and cross traditional borders in your future careers.

Combined Degree Options

Science/Medical Sciences and Business (IVEY)

Concurrent Degree Options

Science/Medical Sciences and Engineering

Science and Nursing

Science and Music



USEFUL LINKS

Why Western Science? uwo.ca/sci/undergraduate/future_students/why_western/index.html

Information for Parents: welcome.uwo.ca/parents/

Residence: housing.uwo.ca/
(All first-year students are guaranteed a spot in residence)

Take a virtual tour! uwo.ca/sci/undergraduate/future_students/campus_visits.html

Experience Western in 360°: welcome.uwo.ca/360/index.html

Entrance Scholarships: uwo.ca/sci/undergraduate/future_students/scholarships_awards.html

Tuition: registrar.uwo.ca/student_finances/fees_refunds/index.html





Biology, Health Sciences, Medical Sciences... What's the Difference?

HEALTH SCIENCES

The Faculty of Health Sciences at Western University is distinct from the Faculty of Sciences and the Schulich School of Medicine & Dentistry.

The Bachelor of Health Sciences (BHSc) program focuses on the interdisciplinary study of health and wellness in an ever-changing society, in addition to domestic and international health systems.

CAREER OPPORTUNITIES

Graduates of the BHSc program have successfully established careers in a wide variety of health-related fields including:

Physical, Occupational, Massage, Radiation, and Respiratory Therapy
Community Public Health

Public Sector Administration and Government Policy Development

Biomedical Ethics

Business: Wellness and Rehabilitation, Pharmaceuticals

Graduate Studies: Health Administration, International Health Policy, Epidemiology, Clinical Anatomy, Global Health

Non-profit sector: (e.g., Heart and Stroke Foundation, Canadian Cancer Society)

Occupational Health & Safety and Clinical Trials Management

Education and Healthcare Law



BIOLOGY



At Western University, programs in Biology are offered by the Faculty of Science.

Modules offered by the Department of Biology allow for the study of life at different levels of biological organisation—from how organisms interact with each other and the environment at the level of the ecosystem through to the study of individual genes in the laboratory.

CAREER OPPORTUNITIES

There is a broad range of employment opportunities for graduates with a biology background at all levels (BSc, MSc or PhD), including:

Professional Schools: Medicine, Dentistry, Optometry, Pharmacy or Nursing

Graduate Programs: MSc and/or PhD

Government: agriculture, environment, fisheries, and health

Business and Industry: research, development and marketing in biotechnology, consulting and health care

Teaching: elementary, secondary or post-secondary institutions

MEDICAL SCIENCES

The Bachelor of Medical Sciences (BMSc) Program is offered jointly by the Faculty of Sciences and the Schulich School of Medicine & Dentistry.

Modules offered by the Basic Medical Sciences explore the molecular, cellular and systemic organisation of the human body and the biological mechanisms it uses to adapt to environmental changes and the challenge of disease.

CAREER OPPORTUNITIES

Many graduates with degrees in Basic Medical Sciences modules go on to careers and employment opportunities that include:

Professional Schools: Medicine, Dentistry, Optometry, Pharmacy or Nursing

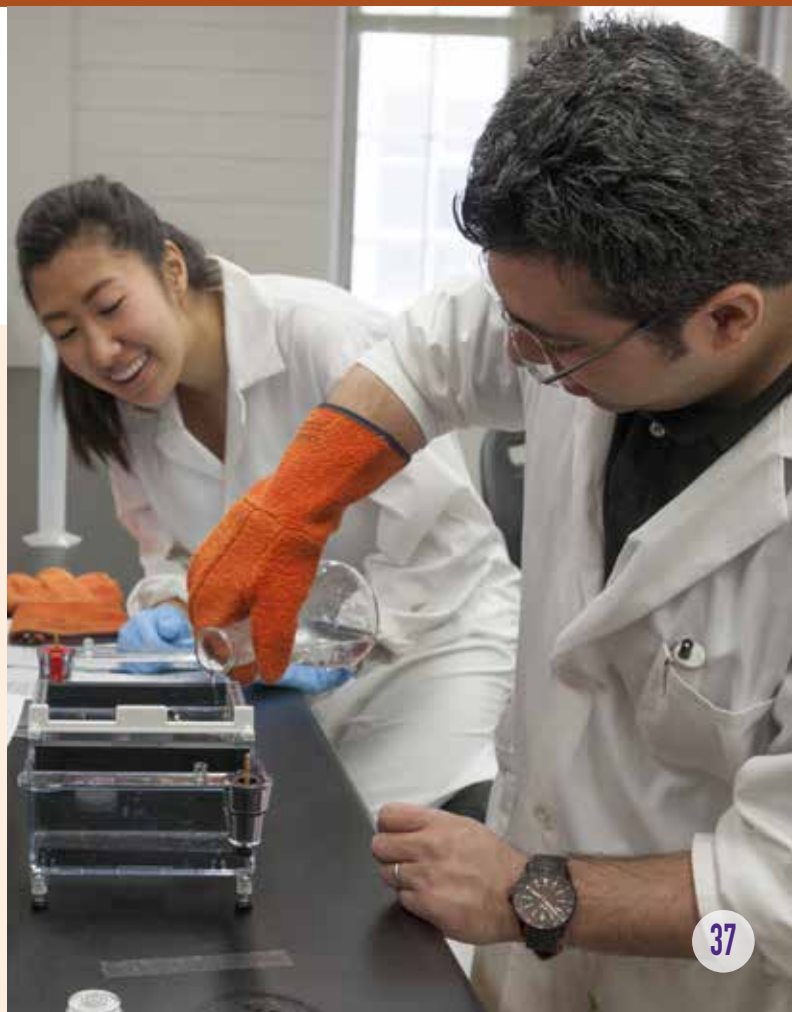
Graduate Programs: MSc and/or PhD

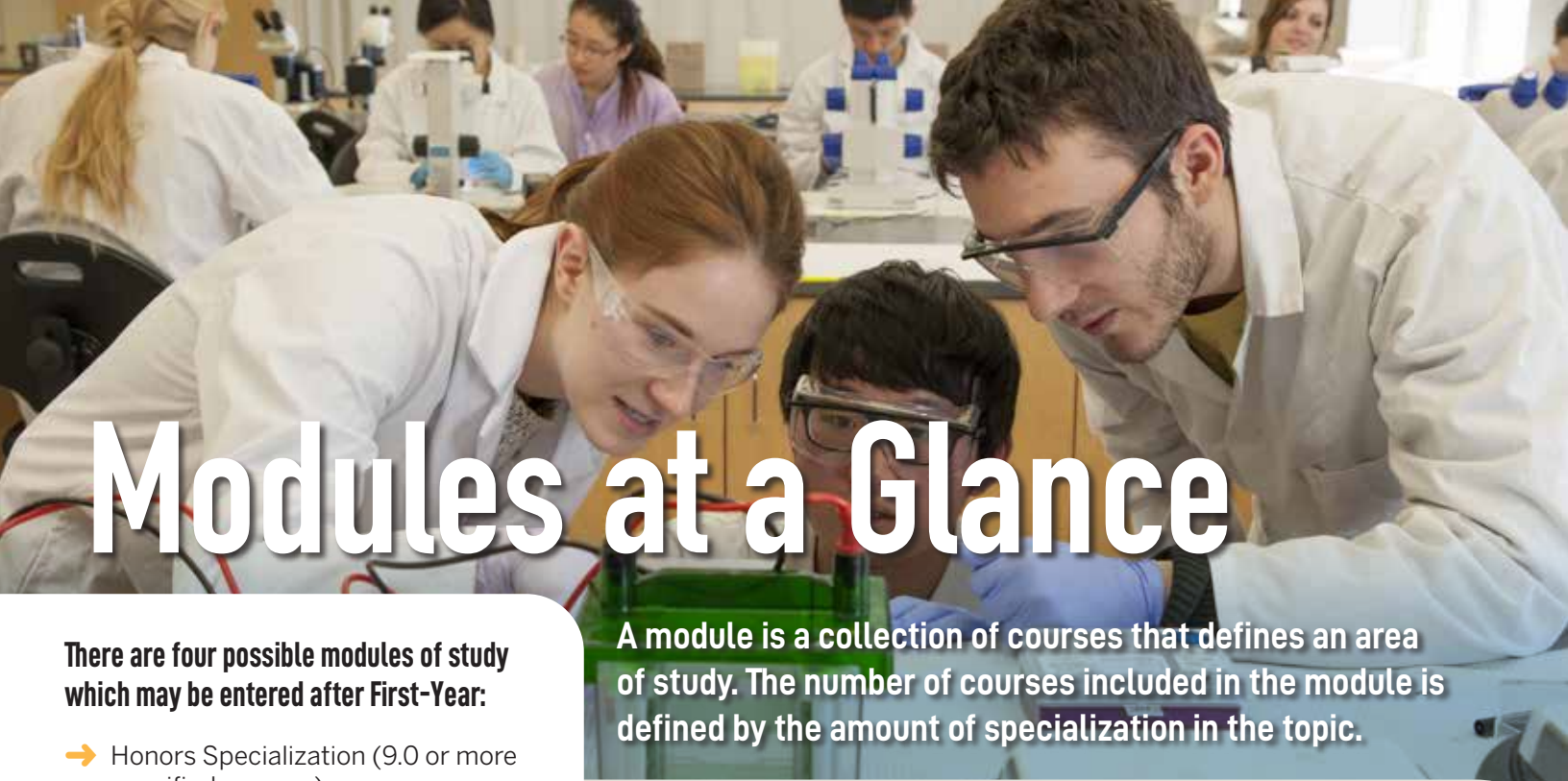
Law: bioethics, patent development for medical products

Business and Industry: biotechnology, marketing, research and development, quality control, pharmaceuticals, biotechnology, biosafety, regulation and enforcement

Government Laboratories: agriculture, marine and environmental sciences

Teaching: elementary, secondary or post-secondary institutions





Modules at a Glance

There are four possible modules of study which may be entered after First-Year:

- Honors Specialization (9.0 or more specified courses)
- Specialization (9.0 or more specified courses)
- Major (6.0 - 7.0 specified courses)
- Minor (4.0 - 5.0 specified courses)



For more information:
WesternuScience.ca/Modules

A module is a collection of courses that defines an area of study. The number of courses included in the module is defined by the amount of specialization in the topic.

Modules can be combined in the three different degree-types:

Honors Bachelor Degree (4 Years/20 courses)	Bachelor Degree (4 Years/20 courses)	Bachelor Degree (3 Years/15 courses)
<ul style="list-style-type: none">• Honors Specialization• Honors Specialization-Major• Honors Specialization-Minor• Major-Major	<ul style="list-style-type: none">• Specialization• Specialization-Major• Specialization-Minor• Major-Major• Major• Major-Minor• Major-Minor-Minor	<ul style="list-style-type: none">• Major• Major-Minor• Minor-Minor

COMPUTER AND MATHEMATICAL SCIENCES

Computer Science

Module	Honors Specialization	Specialization	Major	Minor
Computer Science ¹	○	○	○	○
Bioinformatics	○			
Information Systems	○			
Software Engineering ^{2, 3}				○

Module	Honors Specialization	Specialization	Major	Minor
Computer Hardware Design				○
Theoretical Computer Science ⁴				○
Game Development ⁵				○

¹ The Honors Specialization and Specialization lead to accredited degrees by the Computer Accreditation Council.
² Can only be completed in combination with an Honors Specialization or Specialization in Computer Science.
³ Leads to accredited degrees by the Computer Science Accreditation Council..
⁴ Can only be completed in combination with an Honors Specialization in Computer Science.
⁵ Can only be completed in combination with an Honors Specialization, Specialization, or Major in Computer Science.

THE SCHOOL OF MATHEMATICAL AND STATISTICAL SCIENCES

Applied Mathematics

Module	Honors Specialization	Specialization	Major	Minor
Applied Mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Applied Mathematical Methods			<input type="radio"/>	
Mathematical and Statistical Sciences	<input type="radio"/>			
Mathematical and Numerical Methods				<input type="radio"/>
Scientific Computing and Numerical Methods			<input type="radio"/>	
Theoretical Physics ¹			<input type="radio"/>	

¹ Can only be completed in combination with a Minor or Major in Applied Mathematics.

Mathematics

Module	Honors Specialization	Specialization	Major	Minor
Mathematics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mathematics in Society	<input type="radio"/>	<input type="radio"/>		

Statistical and Actuarial Sciences

Module	Honors Specialization	Specialization	Major	Minor
Actuarial Science	<input type="radio"/>		<input type="radio"/>	
Statistics	<input type="radio"/>			
Applied Statistics			<input type="radio"/>	<input type="radio"/>
Financial Modelling	<input type="radio"/>		<input type="radio"/>	
Applied Financial Modelling				<input type="radio"/>
Data Science	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>

INTEGRATED SCIENCE

Module	Honors Specialization	Specialization	Major	Minor
Integrated Science with Astrophysics	<input type="radio"/>			
Integrated Science with Biology	<input type="radio"/>			
Integrated Science with Chemistry	<input type="radio"/>			
Integrated Science with Computer Science	<input type="radio"/>			
Integrated Science with Earth Sciences	<input type="radio"/>			
Integrated Science with Environmental Science	<input type="radio"/>			
Integrated Science with Genetics	<input type="radio"/>			
Integrated Science with Mathematical and Statistical Sciences	<input type="radio"/>			
Integrated Science with Physics	<input type="radio"/>			



PHYSICAL SCIENCES

Chemistry

Module	Honors Specialization	Specialization	Major	Minor
Chemistry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced Chemistry ¹				<input type="radio"/>
Biochemistry and Chemistry	<input type="radio"/>			

¹ Can only be completed in combination with and Honors Specialization in Chemistry, a Specialization in Chemistry or an Honors Specialization in Biochemistry and Chemistry.

Physics and Astronomy

Module	Honors Specialization	Specialization	Major	Minor
Physics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Astrophysics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Advanced Physics ¹				<input type="radio"/>
Conceptual Astronomy				<input type="radio"/>
Materials Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical Physics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Physics of Materials ²				<input type="radio"/>

¹ May only be completed in combination with an Honors Specialization or Specialization in Physics, Astrophysics or Medical Physics.

² May only be completed in combination with an Honors Specialization or Specialization in Physics.



Earth Sciences

Module	Honors Specialization	Specialization	Major	Minor
Geology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Geology and Biology	<input type="radio"/>	<input type="radio"/>		
Geophysics	<input type="radio"/>	<input type="radio"/>		<input type="radio"/>
Planetary Science and Space Exploration				<input type="radio"/>
Environmental Science for Professional Registration	<input type="radio"/>	<input type="radio"/>		
Geology for Professional Registration	<input type="radio"/>	<input type="radio"/>		
Geophysics for Professional Registration	<input type="radio"/>	<input type="radio"/>		

Environmental Science

Module	Honors Specialization	Specialization	Major	Minor
Environmental Science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SCIENCE OF LIVING ORGANISMS

Biology

Module	Honors Specialization	Specialization	Major	Minor
Biology	○	○	○	○
Animal Behaviour	○			
Biodiversity and Conservation	○			
Ecosystem Health			○	
Genetics	○		○	○
Genetics and Biochemistry	○			
Synthetic Biology	○			

Basic Medical Sciences

Module	Honors Specialization	Specialization	Major	Minor
Biochemistry	○		○	○
Biochemistry and Cancer Biology	○			
Biochemistry and Cell Biology	○			
Biochemistry of Infection and Immunity	○			
Biochemistry and Pathology of Human Disease	○			
Chemical Biology	○			
Computational Biochemistry	○			
Epidemiology and Biostatistics	○		○	○
Interdisciplinary Medical Sciences ¹	○	○	○	
Medical Biophysics			○	○
Medical Biophysics (Clinical Physics Concentration)	○			
Medical Biophysics (Medical Science Concentration)	○			
Medical Biophysics and Biochemistry	○			
Medical Cell Biology	○		○	○
Medical Health Informatics	○			
Microbiology and Immunology	○		○	○

Module	Honors Specialization	Specialization	Major	Minor
Microbiology and Immunology with Pathology	○			
One Health	○			
Pathology	○		○	
Pharmacology	○		○	○
Physiology	○		○	
Physiology and Pharmacology	○			

A degree containing one of the Honors Specializations modules above will lead to a BMSc (Honors) degree. Students completing one of the Specialization modules above will graduate with a 4-year BMSc (non-Honors) degree.

Completion of two of the Majors above will lead to either a BMSc (Honors) or a 4-year BMSc degree depending on the marks achieved.

The IMS and Pathology Major modules must be completed in a BMSc degree. Any of the other Major modules or a Minor module(s) above can be completed in other degree types, such as Bachelor of Science (BSc) or Bachelor of Arts (BA).

The majority of BMSc students choose to complete Honors Specialization modules and some elect to complete an additional Major or Minor module from either Basic Medical Science or another faculty.

Modules Leading to a BSc Degree

Biochemistry and Chemistry	○			
Genetics and Biochemistry	○			
Medical and Biophysics (Biological Concentration)	○			
Medical Biophysics (Physical Science Concentration)	○			
Neuroscience	○			
Medical Sciences			○	○

¹ The Major in Medical Sciences cannot be completed in combination with any of the following Majors: Biochemistry, Medical Biophysics, Medical Cell Biology, Microbiology and Immunology, Pharmacology



Live the Science You Learn @ Western

The university experience is far more than the sum of your lectures and textbooks. At Western Science, you'll experience research, hone practical skills with labs and field courses and build communications skills through written reports and presentations. We call it high-impact learning. You'll call it highly rewarding.

CAPSTONE PROJECTS

Both the BSc and BMSc programs offer a mentored research project in a world-class professor's lab. This could be your hands-on introduction to our cutting-edge facilities, science research and may even result in your first technical publication.

SCIENCE/BASIC MEDICAL SCIENCE INTERNSHIP PROGRAM

Gain significant work experience, 'try-on' a career, and make valuable contacts – all while earning a full salary. These eight-16-month paid positions in industry and government are open to Year-3 students.

INTERNATIONAL LEARNING OPPORTUNITIES

Interested in experiencing a new culture, language or exotic venue while developing your knowledge, skills and network? Western encourages global exploration through exchanges and study abroad programs with other universities, field schools, summer research, internships and volunteer opportunities.

SUMMER RESEARCH

Working in a lab over the summer is a great way to explore your research interests, develop technical skills, expand your network and be mentored by world-class researchers and their graduate students. The NSERC Undergraduate Summer Research Award, Western programs, and individual researcher's grants combine to offer a wide variety of opportunities. You may even end up authoring your first professional research paper!



For more information:

uwo.ca/sci/undergraduate/future_students/beyond_the_classroom

AUTHENTIC LEARNING CONTEXTS

- Take courses which simulate the development arm of software companies and game studios.
- Develop an innovative business plan to commercialize novel science and emerging technologies by competing in the Proteus Innovation Competition.
- Receive course credit while attending the National Undergraduate Capstone Open Source Project
- Apply academic knowledge to exciting projects on the ground in national and international locales; study forest ecology in the Adirondacks, desert ecology in the American southwest, tropical marine environments in Belize, and craters in the Sultanate of Oman.

EXPLORE A NEW LEARNING LANDSCAPE

I chose to go to Singapore for my exchange because the University of Singapore is the number one school in Asia; they offer a full year exchange, which many other schools do not and it is a great location for travelling on weekend trips to experience the many different cultures across the continent.

JAMIE

BSc'18, Major in Medical Sciences
and French Studies



Career Paths

Computer Science
Physics and Astronomy
School of Mathematical & Statistical Sciences





Career Paths

Basic Medical Sciences
Chemistry
Environmental Science
Earth Sciences





Technical
Writer

Government
(Science Policy)

Professional
School

Production
Chemist

CHEMISTRY



Pharmacologist

Quality
Control
Technician

Conservation

Policy
Development

Natural
Hazards
Research



Education

ENVIRONMENTAL SCIENCE

Management
of Water
Resources

Professional
School

Research

Resource
Sustainability

Metal And
Industrial
Mining and
Exploration

Remediation of
Contaminated
Sites



Satellite and
Land-based
Imaging for
Exploration





Western Science

North Campus Building
Western University
London, Ontario
N6A 5B7



uwo.ca/sci



scibmsac@uwo.ca



[@WesternuScience](https://twitter.com/WesternuScience)



[@WesternuScience](https://www.instagram.com/WesternuScience)