Basic Medical Sciences

Web: www.uwo.ca/bmsc

WHAT ARE THE BASIC MEDICAL SCIENCES AT WESTERN?

The Basic Medical Sciences at Western focus on all aspects of biology that define and influence the human condition. Emphasis is placed on understanding the normal human health condition, mechanisms of current treatment and the search for cures. The scientific principles presented are fundamental to all aspects of modern research and technology and thus impact diverse areas of our society.

The Bachelor of Medical Sciences (BMSc) degree is a 4-year degree offered jointly by the Faculty of Science and the Schulich School of Medicine & Dentistry. It is designed for students interested in advanced study in one or more of the basic medical sciences. This joint approach provides the opportunity to learn and understand the interrelationship between the basic and clinical medical sciences and to explore one or more of the disciplines in depth.

A BMSc Honors degree must contain either one of the Honors Specialization modules or two of the Major modules listed in the table onthe next page. A non-Honors BMSc degree contains either a Specialization module or two of the Major modules.

Enrolment in the BMSc Program is limited and competitive.

Approximately 400 students, who meet minimum mark requirements and satisfy certain criteria, are admitted to the BMSc Program in each of Years 2 and 3. Once admitted to Year 3 of the BMSc Program, students are assured the opportunity of completing a BMSc degree.

Enrolment in Honors Specialization modules within the BMSc Program is limited and competitive.

Each Honors Specialization module has a limited number of spaces in either the Year 4 research project (discipline-specific modules) or the interdisciplinary lab (Honors Specialization in Medical Sciences). Consequently, a limited number of students will be admitted to each Honors Specialization module in each of Years 2, 3 and 4.

A Major or Minor module, offered by the basic medical science departments, can be taken alone or combined with modules from other Western faculties to earn degrees such as a Bachelor of Science (BSc) or Bachelor of Arts (BA). Some basic medical sciences departments also contribute to Honors Specialization modules leading to BSc Honors degrees (see the Interdisciplinary Modules listed in the table on the next page).

Tariq Esmail
Honors Specialization in Medical Sciences
Class of 2010

"The BMSc Program offers more than what could be described on paper. There is a real sense of integration, which results in the application of learning from all angles. You are given the opportunity to challenge ideas in order to learn and to get to the root of scientific explanations. You learn how to ask the right questions to interpret scientific information in a way that makes it accessible to all, and then take this knowledge to the lab where the world of research is at your fingertips. The choices within the program also provide you with the flexibility to explore subject areas that interest you the most.

While at Western, my academics were complemented by a vast array of extra-curricular activities, from Vice President of the Science Students' Council to Campus Tour Guide for undergraduate recruitment. I was involved with bringing David Suzuki to Western to speak and fundraising for Shinerama. I participated in O-week as a first year and as a volunteer, and I travelled to Costa Rica with Alternative Spring Break…and that's not everything!

You will very quickly find that at Western you can do what you love in the classroom and outside."

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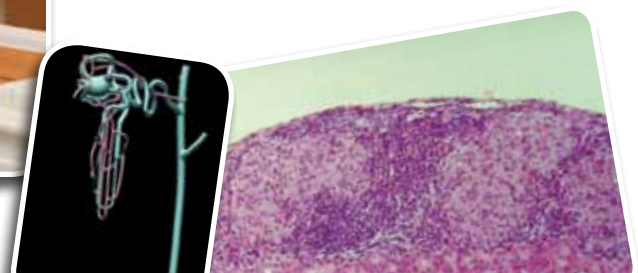
The following modules, offered by the Basic Medical Sciences departments, provide basic and advanced knowledge in the discipline, problem solving skills, and hands-on laboratory work.

MODULE	HONORS SPECIALIZATION	SPECIALIZATION	MAJOR	MINOR
Biochemistry	✓	✓	✓	✓
Biochemistry and Cell Biology	✓			
Biochemistry of Infection and Immunity	✓			
Clinical Biochemistry	✓			
Medical Biophysics (Medical Sciences concentration)	✓	✓	✓	✓
Medical Cell Biology	✓		✓	✓
Medical Sciences	✓	✓	✓	✓
Microbiology and Immunology	✓	✓	✓	✓
Pathology and Toxicology	✓	✓		
Pharmacology	✓	✓	✓	✓
Physiology	✓	✓	✓	
Physiology and Pharmacology	✓	✓		
INTERDISCIPLINARY MODULE (BSc)				
Biochemistry and Chemistry	✓			
Bioinformatics (Biochemistry Concentration)	✓			
Genetics and Biochemistry	✓			
Medical Biophysics (Physical Science Concentration)	✓			
COMBINED DEGREE (5 YEARS)	BMSc (Honors Specialization in Medical Sciences) / HBA (Business Administration)			

Biochemistry

Web: www.biochem.uwo.ca

Biochemistry involves the study of key biological macromolecules and their processes. Students learn principles and techniques that underlie modern medicine, including manipulation of the genome, molecular bases of disease and understanding how information from genome sequencing impinges on our understanding of protein structure and function. Major emphases within the Biochemistry modules include molecular biology; genome dynamics, structure and regulation; protein structure; and the molecular basis of development, cell growth and differentiation.



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Medical Biophysics

Web: www.uwo.ca/biophysics

Explore the world of medical science and innovative technology at Western by applying principles of mathematics, biology, physics and engineering to your coursework. Medical Biophysics offers a multi-faceted approach to basic research and problem solving in human biology with application to clinical research in both medicine and dentistry. Course material is based on faculty expertise in fields such as vascular disease, microcirculation and cancer metastasis, computer simulations of blood flow, environmental hazards of magnetic fields, biological effects of ionizing radiation, biomechanics of bone and soft tissue injuries as well as imaging techniques including CT, ultrasound, MRI and their applications to image guided surgery and therapy.

Key courses include independent participation in research, including a 6-week project in 3rd year and a full-year 4th year project. Previous students have investigated topics such as: MRI of stem cells in spinal cord injuries, stress distribution in the impacted human skull, the fate of cancer cells in the circulation, ultrasound imaging in breast cancer biopsy and radiation treatment planning, ultrasound-guided robotic surgery and mathematical modeling of oxygen delivery in transplanted heart valves.

Medical Cell Biology

Web: www.uwo.ca/anatomy

Modules in Medical Cell Biology are offered by the Department of Anatomy and Cell Biology. Medical Cell Biology consists of the study of humans at the molecular, cellular, tissue and systems level. The modules integrate information from each of these areas to yield an understanding of the relationship between structure and function in the organism as a whole.

Courses offered in our modules allow students to study the gross anatomical features of all the human body systems; to explore the relationship of structure and function; to understand how cells in the human body interact when forming tissues, maintaining homeostasis and regulating behaviour; and to learn about the cellular mechanisms governing normal and pathological processes such as cancer, cardiovascular disease and mental disorders. The broad scope of this program offers students a diverse set of career options. These career paths include graduate and professional schools, employment in drug and pharmaceutical companies, employment in government agencies, scientific research and teaching.

Medical Sciences

Web: www.uwo.ca/bmsc/medical_sciences.htm

The modules in Medical Sciences provide an opportunity to learn and understand the interrelationships between the basic and clinical medical sciences. Students wishing to study more than one discipline will enjoy the flexibility of the Medical Sciences modules as they have access to courses offered by all the basic medical sciences departments. Courses available to students include: bacterial pathogenesis, general biophysics, mammalian physiology, cellular and molecular biology, molecular biology of DNA and RNA, principles of drug action, selected topics in medical sciences, and systemic human anatomy.

Microbiology and Immunology

Web: www.uwo.ca/mni

Our department provides undergraduate courses which integrate the study of microorganisms with an understanding of the human immune response to infectious agents. Early courses in our department introduce students to the fundamental properties of bacteria and viruses, as well as a comprehensive understanding of immunology. Our more advanced courses

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focus on the molecular basis of bacterial and viral pathogenesis, molecular genetics, and other relevant areas such as autoimmunity and the immunology of cancer. We offer early laboratory experience in Microbiology and Immunology, and a major component of the Honors Specialization modules is a research project and seminar course where a wide range of projects are available for students to provide valuable and rewarding experience in a research laboratory.

Pathology and Toxicology

Web: www.uwo.ca/pathol

Building on a foundation of anatomy, biochemistry, cell biology and physiology and the understanding of normal mammalian systems, students move on to pathology — the study of human disease. Basic mechanisms underlying disease are investigated with an in-depth look at some of the major organ disorders (e.g., cardiovascular disease, kidney disease, neuropathology). Complemented by the study of toxicology, the effects of drugs, chemical, and biological toxins on mammalian systems, those hazards in the workplace and the environment that lead to illness and disease are also examined. An advanced course in forensic sciences examines the medico-legal framework in the investigation of certain deaths, particularly in sudden death, and the effects of various external agents on the human body.

Pharmacology

Web: www.schulich.uwo.ca/physpharm

Pharmacology is the study of drug actions on biological systems, including their chemical properties, biological effects, and use in the diagnosis and treatment of disease. Courses in toxicology examine the harmful effects produced by drugs and chemicals from natural, agricultural and industrial sources. A major part of an Honors Specialization in Pharmacology is a research project in a professor's laboratory. These projects might be on anti-cancer and anti-viral therapy, neuropharmacology, cardiovascular pharmacology, molecular pharmacology/ toxicology, drug-drug and drug-food interactions, medicines from natural sources, and metabolism of exogenous agents including drugs and environmental toxins.

Physiology

Web: www.schulich.uwo.ca/physpharm

Physiology is the study of how the body works. A key concept in physiology is homeostasis, which describes how all the body processes work together to provide normal function, and to adapt to external (e.g., temperature, oxygen levels) and internal (e.g., disease) challenges to our body systems. Human physiology at Western offers an exciting, dynamic approach to understanding how individual cells with incredible complexities work together to produce a finely tuned, integrated whole body that is much more than the sum of its parts. The Honors Specialization modules in Physiology and Physiology & Pharmacology are research-oriented programs. In these programs students discover what's new in our understanding of how the human body works and have the opportunity to work side-by-side with a faculty researcher in a laboratory performing original experiments.