



Graduate studies in **MEDICAL BIOPHYSICS**

What is Medical Biophysics?

Medical Biophysics is an interdisciplinary graduate department in the Faculty of Medicine at the University of Toronto. Our research applies fundamental investigation in the biological and physical sciences to address the problems of medicine. The diversity of our Faculty and the abundance of multi-disciplinary projects reflect these objectives. Our laboratories are located in the Canada's largest cluster of hospital-based institutes and situated in downtown Toronto.

The focus of the Department is on research and the training of graduate students. The Department offers opportunities for graduate research in a wide variety of projects, which often cut across the conventional boundaries of physics, engineering, chemistry, biology and medicine. The Department emphasizes basic and translational research related to cancer (principally at the Princess Margaret Cancer Centre) and cardiovascular medicine (principally at Sunnybrook Research Institute). Projects include: tumour biology, radiobiology, membrane function, molecular interactions, gene expression, cell differentiation, growth control, signal transduction, viral and chemical carcinogenesis, cellular and molecular immunology, hemopoiesis, mouse genetics, bioinformatics, proteomics, determination of macromolecular structures by electron microscopy, x-ray crystallography and NMR spectroscopy, the physics of radiation therapy and diagnostic imaging, development of imaging systems involving ultrasound, nuclear magnetic resonance, x-rays, electron optics and lasers, image guided therapy and experimental therapeutics using light, sound and ionising radiation.

Graduate Programs Overview

The principal objective of our PhD program is to prepare students for a career in research. The graduate program is organized into three scientific streams: Cellular, Molecular and Structural Biology (with an emphasis on cancer biology) and Medical Physics & Imaging. The ability to communicate between these disciplines and between medical and scientific specialties is at the heart of our program. Graduate students are selected primarily for their interest and potential to become research scientists. The M.Sc. program is a common entry point but the emphasis is on reclassification into the Ph.D. program.

Collaborative Programs

The Collaborative Programs at the University of Toronto offer an opportunity to benefit from the largest research community in Canada and give graduate students access to multiple departments engaged in research areas of interest to faculty and students. Medical Biophysics participates in the collaborative graduate programs in:

- Cardiovascular Science
- Biomolecular Structure (MBP was a founding member)
- Neuroscience
- Genome Biology & Bioinformatics

In addition to joint courses, most collaborative programs include mechanisms of interaction, such as seminar series, retreats and poster days.

Applying to Medical Biophysics

The Department welcomes applications from graduates in any of the biological or physical sciences including: chemistry, biology, genetics, immunology, and biochemistry, or from medicine, engineering, computer sciences, or related sciences, and evaluates them both on academic record and potential for creative research.

Most students have at least an **A- average** in their final two years as undergraduates, but this guideline is flexible, especially for applicants who have demonstrated exceptional aptitude for research.

To apply, you will need to submit an online application at <http://medbio.utoronto.ca/content/prospective-students>. A complete application includes: SGS online application and fee; two references (which should be completed by faculty members who are best able to assess your potential to undertake graduate studies); a letter of intent summarizing your academic achievements, research interests and details of any related research experience; Resume/CV; transcripts and other relevant documents.

The deadline to apply for September 2017 admission is January 4, 2017.

Students are encouraged to submit a complete application by January 4th for early acceptance. We will continue to accept applications until May 15, 2017.

Stipend/Funding

The Department encourages students to apply for all financial awards for which they are eligible (NSERC, CIHR, etc). Regardless of success in obtaining an external award, all students receive a minimum stipend. This stipend for the 2016-17 academic year begins at a \$18,000 living allowance for the M.Sc., rising to \$20,000 when you enter the Ph.D. program, plus tuition and incidental fees making an estimated total of \$26,492 (assuming a 4% increase from current tuition levels). If you receive a competitive scholarship, the Department will give you a top-up incentive of \$4,000 above the minimum stipends described above. Scholarships whose value is above the minimum stipend are kept by the student.

Achievements of Medical Biophysics Scientists

Faculty in the Medical Biophysics have an impressive history of discovery and achievement, and have received many national and international awards. Amongst Medical Biophysics firsts: Cancer Biology - discovery of the multidrug resistance protein (V. Ling), Developmental Biology - discovery of the hematopoietic stem cell (E.A. McCulloch & J.E. Till), Imaging Physics - invention of the ultrasound biomicroscope (S. Foster), Macromolecular Structure - development of the electron spectroscopic analyzer (F.P. Ottensmeyer), Radiation Physics - development of the Cobalt 60 Unit for treating cancer (H.E. Johns), Molecular Immunology - identification of the T cell receptor (T. Mak), Cell Biology - gravity cell separator (R.G. Miller and R.A. Phillips); identification of p53 as a tumour suppressor (S. Benchimol); identification of SAP kinase pathway (J. Woodgett), identification of immunological factors in osteoporosis (J. Penninger). Many of our graduates hold leading positions in Research Institutes and Universities across Canada, the U.S. and throughout the world.

Research Facility Locations

Our scientists work in Hospital Research Institutes which offer unique resources for translational biomedical science. These include the Princess Margaret Cancer Centre; Sunnybrook Research Institute; Ontario Institute for Cancer Research; Hospital for Sick Children; The Toronto Hospital and Mount Sinai Hospital.

Contact Information

Biological Sciences applicants

Ms. Annette Chan
Department of Medical Biophysics
MaRS Centre, PMCRT
101 College Street, 15-708
Toronto, Ontario, M5G 1L7
Telephone: 416-634-8751
E-Mail: acw.chan@utoronto.ca

Mathematics, Physics and Engineering applicants

Ms. Donna-Marie Pow
Department of Medical Biophysics
Sunnybrook Research Institute
2075 Bayview Avenue, Rm. S655
Toronto, Ontario, M4N 3M5
Telephone: 416-480-5496
E-Mail: donna-marie.pow@sri.utoronto.ca