PHYS 5209 for Fall 2026

Medical Physics Practical Measurements

We, the people of the Faculty of Science at Carleton University, acknowledge that our campus is located on the traditional, unceded territories of the Algonquin Anishinabeg people. Miigwetch for your hospitality and stewardship of this territory and the teachings that come from it. We are grateful for this land, the air that we breathe, and the water that sustains us all as well as for the animals, plants and other living beings: these enable us to research, teach, mentor, support, study, and learn. We recognize our responsibility to our natural environment and to reconciliation with Indigenous peoples.

Course Coordinator: Avery Berman

Email: avery.berman@carleton.ca

Best Ways to be in Touch: Via email or in person

Office Location: HP 2420

Class Location: Various locations for each module

Class Times: Vary per module

Prerequisites: PHYS 5203. Typically, students will also have taken PHYS 5204, PHYS 5206, and PHYS 5207, or have received permission of the department. If you lack any of the prerequisites or you are not certain about your eligibility for the course registration, see the course coordinator.

Topics Covered and Learning Outcomes

In the clinical environment, Medical Physics encompasses a wide variety of specialties and requires both theory and practice. The goal of this course is to provide an opportunity for students to acquire hands-on experience in clinical Medical Physics to complement other coursework in their program of study. As well, the intention of the course is to broaden student knowledge in Medical Physics subjects that may not necessarily be in the student's area of specialization. The course is intended for senior Medical Physics graduate students typically close to the completion of their degree program who seek familiarization with the technology currently used in the practice of clinical Medical Physics. The course is organized into a set of six modules. Most of the modules will be from areas outside the student's main specialty. It is not expected that a student will become an expert in the specialization of the module but rather gain an appreciation for the other areas of medical physics represented in the clinical environment.

Topics to be Covered

Module	**Instructor/contact**
Calibrating the output of a clinical linear accelerator	Dr. Bryan Muir (NRC)
SPECT Image Quality	Dr. Glenn Wells (UOHI)
Biological Dosimetry for Ionizing Radiation	Dr. Ruth Wilkins (Health Canada)
Magnetic Resonance Imaging	Gerd Melkus (TOH), Claire Foottit (TOH)
Introduction to the External Beam Radiation Therapy Treatment Process	Dr. Katie Lekx-Toniolo (TOH)
Special Radiotherapy Application: Brachytherapy	Dr. Madeleine Van de Kleut (TOH)

Important dates and deadlines can be found here: https://calendar.carleton.ca/academicyear/, including class suspension for fall, winter breaks, and statutory holidays.

Course-level learning outcomes:

Upon successful completion of this course, students will have:

1. Demonstrated ability to make basic physics measurements on medical imaging systems, cancer radiation treatment systems, and in radiation biology,

including choosing the correct instruments, using them accurately, and ensuring they are left ready for clinical or research use.
2. Articulated their preparatory medical physics knowledge in an oral interview environment and documented their medical physics measurements clearly and effectively via written reports.
3. Observed and practised the role and responsibility of the professionally practising physicist, especially with regard to health and safety, ethics, scientific integrity, and working within the constraints of resource utilization.
4. Demonstrated ability to apply related knowledge such as computational physics and mathematics.
5. Worked collaboratively and effectively with peers
6. Recognized and integrated the history and current issues of medical physics technologies, international standards for those technologies, and regulatory oversight.

Assessments

The final grade in the course will be based on the average of the six modules. For each module, the mark will be calculated using the following weighting:

Grade Breakdown

COMPONENT	GRADE VALUE
Preparatory reading and lectures	15%
Hands-on participation and skills with equipment	35%
Written report	50%

(1) Preparatory reading and lectures

Students will be expected to work with equipment that will be used frequently by the hospital and will require instruction from clinical personnel. It is expected that students acquire satisfactory background knowledge before beginning a module. Some models may include a lecture component (2 hours or less). Each module instructor may assign pre-readings (50 pages or less) chosen from chapters in textbooks used in the prerequisite courses or clinical practice reports. A student's preparedness will be assessed during an interview with the instructor.

Lectures may be online or held off-campus at different times.

(2) Hands-on participation and skills with equipment

A student's practical skills will be assessed during the course of module completion.

(3) Written report
After completion of a module, each student will be expected to submit a typed report to the module instructor, who will mark it. Each module instructor will pose specific questions that should be answered by the students in their written report. If the instructor wishes the student to, for example, review some theory or describe the equipment, this should be specifically asked for. **The focus of the report should be on the measurements done, data analysis, and conclusions.**

The report should be approximately 5 pages including graphs and figures, single-spaced, 2.5 cm margins on all sides, font size 12. It should be written with the view that the reader already knows the field. **Please clarify with your module instructor(s) what their expectations are.**

Late and Missed Work Policies

Late and Missed Work
Late work is generally not accepted. If you have a legitimate reason for being absent or being unable to complete coursework, please be in touch with the module coordinator(s) and the course coordinator and complete and submit an academic considerations form, including for longer-term (>5 days) accommodation.

Learning Material(s) and Other Course/Lab-Related Resources

Each module instructor may assign pre-readings (50 pages or less) chosen from chapters in textbooks used in the prerequisite courses or clinical practice reports.

Academic Accommodations and Regulations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/).

Statement on Generative Artificial Intelligence (GenAI) Usage

It is the policy of the coordinator that all thoughts and views presented must be your own, not provided by an AI. The use of an AI to help refine your written work is acceptable; however, any use of AI must be clearly stated at the top of the work. Individual module instructors may have differing policies on the use of AI in the course.

Statement on Academic Integrity

Students are expected to uphold the values of academic integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using Generative Artificial Intelligence (GenAI) tools when course assessment instructions indicate such use is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy. A list of standard sanctions in the Faculty of Science can be found here.

Additional details about this process can be found on the Faculty of Science Academic Integrity website.

Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If a concern arises regarding this course, **your first point of contact is me**: Email or visit me at my office, and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are (in this order):

Note: You can also bring your concerns to Ombuds services.