

# PHYS 5209 Medical Physics Practical Measurements Course manual 2022

## Introduction

### I *General Remarks*

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 compliment 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 (i.e., biophysics, imaging or therapy). 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.

### II *Learning Outcomes*

Upon successful completion of this course, students will have:

- 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.
- articulated their preparatory medical physics knowledge in an oral interview environment and documented their medical physics measurements clearly and effectively via written reports.
- 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.
- demonstrated ability to apply related knowledge such as computational physics and mathematics.
- worked collaboratively and effectively with peers.
- recognized and integrated the history and current issues of medical physics technologies, international standards for those technologies, and regulatory oversight.

### III *Course Structure*

The course prerequisite, in accordance with the Graduate Calendar is PHYS 5203. Typically, students will also have taken one or more of the following: PHYS 5204, PHYS 5206, PHYS 5207 or other biophysics course, 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.

Completion of six modules is required for credit in the course. There are five mandatory modules (in bold in the table below) and one module that can be chosen by each individual student from a list. The current list of projects is as follows:

	Module Title	Instructor or contact
<b>1</b>	<b>Introduction to the External Beam Radiation Therapy Treatment Process</b>	Dr. Lesley Buckley Department of Medical Physics, The Ottawa Hospital
<b>2</b>	<b>Biological Dosimetry for Ionizing Radiation</b>	Dr. Ruth Wilkins Ionizing Radiation Health Sciences Division, Consumer and Clinical Radiation Protection Bureau, Health Canada
3a	SPECT Image Quality	Dr. Glenn Wells Nuclear Cardiology University of Ottawa Heart Institute
3b	Positron Emission Tomography	Dr. Rob DeKemp Cardiac Imaging University of Ottawa Heart Institute
<b>4</b>	<b>Special Radiotherapy Application: Brachytherapy</b>	Dr. Lesley Buckley Department of Medical Physics, The Ottawa Hospital
<b>5</b>	<b>Calibrating the output of a clinical linear accelerator</b>	Dr. Bryan Muir Ionising Radiation Standards National Research Council of Canada
<b>6</b>	<b>Magnetic Resonance Imaging</b>	Dr. Gerd Melkus Dr. Claire Footitt  The Ottawa Hospital

Each module is to be completed in 2 weeks and, in principle, no new module should be started prior to completion of those already undertaken.

#### IV Grading

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:

- |   |   |                                     |
|---|---|-------------------------------------|
| (i) Preparatory reading and lectures                  | - | 15%, assigned by module instructor; |
| (ii) Hands on participation and skills with equipment | - | 35%, assigned by module instructor; |
| (iii) Written report                                  | - | 50%, assigned by module instructor  |

(i) 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 prior to 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.

(ii) Hands on participation and skills with equipment:

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

(iii) 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.**

#### V *Dates and Coordination of the Modules*

Module 1:	Sept 7 - Sept 20
Module 2:	Sept 21 - Oct 4
Module 3:	Oct 5 – Oct 18
Module 4:	Oct 19 – Nov 8 (includes reading week)
Module 5:	Nov 9 – Nov 22
Module 6:	Nov 23– Dec 6

Prior to beginning a module, students who are taking the same module should choose one member of the group to coordinate the initial meeting with the module instructor. **Please copy your course coordinator on your emails to your instructors.**

#### VI *Course/Module Evaluation*

Your comments on the module or course organization, possible improvements, etc., will be appreciated and they can be attached to the report on a separate sheet of paper. If you feel that the remarks will be of interest to the instructor only or to the course coordinator only, you may submit comments to the appropriate person separately.

Course Coordinator:

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