



Practical Measurements in Radiation Therapy

The University of Toledo
Radiation Oncology, Medical Physic, College of Medicine & Life Science
MPHYS 6320/8320

Instructor:	David Pearson, PhD	Course Website:	NA
Email:	david.pearson2@utoledo.edu	Class Location:	HSC DCC 2050G/Flower
Office Hours:	MWF 2-4pm & By appointment	Class Day/Time:	Monday 4-7pm
Office Location:	HSC DCC 2050E	Lab Location:	NA
Instructor Phone:	419 383-6780	Lab Day/Time:	NA
Offered:	Summer	Credit Hours:	2

SPECIAL COURSE EXPECTATIONS DURING COVID-19

ATTENDANCE

The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Students must perform a daily health assessment, based on based on [CDC guidelines](#), before coming to campus each day, which included taking their temperature. Students who are symptomatic/sick should not come to class and should contact the Main Campus Health Center at 419-530-3451. *Absences due to COVID-19 quarantine or isolation requirements **are** considered excused absences.* Students should notify their instructors and these absences may not require written notice.

FACE COVERINGS

All students must wear face coverings while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. NO students will be permitted in class without a face covering. If you have a medical reason that prevents you from wearing a face covering due to a health condition deemed high-risk for COVID-19 by the Centers for Disease Control and Prevention (CDC), you should submit a request for an accommodation through the Student Disability Services Office (SDS) by completing the [online application](#). Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. If a student is already affiliated with SDS and would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs.

SOCIAL DISTANCING

Students should practice social distancing inside and outside the classroom please follow signage and pay attention to the seating arrangements. Do not remove stickers or tape from seats and/or tables, this is there to provide guidance on the appropriate classroom capacity based on the recommended 6 feet of social distancing between individuals. Please be conscious of your personal space and respectful of others. Also be cognizant of how you enter and exit the room; always try to maintain at least 6 feet of distance between yourself and others.

DESKS AND WORK SPACES

Students will need to sanitize their desks and/or work space before class with the University provided sanitizing spray and paper towels their desks.

SPECIAL NOTES

It's important to note that based on the unpredictability of the COVID-19 virus things can change at any time so please be patience and understanding as we move through the semester. I also ask that you keep me informed of



concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.

CATALOG/COURSE DESCRIPTION*

An introduction to the practical use of radiation therapy equipment and their application including CT simulators and linear accelerators. Common quality assurance techniques and methodologies.

COURSE OVERVIEW/ TEACHING METHODOLOGY

The aim of this lab course is to bridge the gap between the didactic courses of the first year and the clinical rotations of the second year. Each weekly lab covers a critical area of a medical physicist's responsibilities in a clinical radiation therapy department.

STUDENT LEARNING OUTCOMES*

By the completion of this lab course students would be expected to have a basic understanding of the most commonly used quality assurance protocols used in therapeutic medical physics. Students will be introduced to the practical implementation of common quality assurance standards as recommended by the American Association of Physicists in Medicine.

1.

Describe how to perform end-to-end testing of system of stereotactic radiosurgery

2.

Ability to implement an unplanned radiation therapy treatment

3.

Ability to follow the recommendations of AAPM Task Group report 51: Linear accelerator output measurements in water

4.

Practical skills to perform 3D beam scanning using the Wellhofer scanning water phantom

5.

Ability to perform measurements of photon & electron output factor measurements in water

6.

Ability to perform standard quality assurance of a linear accelerator, as recommended by AAPM Task Group 142

7.

Ability to perform standard quality assurance of a CT simulator, as recommended by AAPM Task Group 66

8.

Describe a process of calibration and clinical use of in-vivo dosimetry using Optically Stimulated Luminescent Dosimeters (OSLDs)



PREREQUISITES AND COREQUISITES

None

TEXTS AND ANCILLARY MATERIALS

This course utilizes a hands-on practical training in a lab setting. Students will spend time operating the equipment most commonly found in a clinical radiation therapy department.

TECHNOLOGY REQUIREMENTS

Access to a PC will be provided during the time of the class. Some experience in the use of spreadsheets to record measurements is required.

ACADEMIC POLICIES

[Graduate Policies](http://www.utoledo.edu/policies/academic/graduate/)<http://www.utoledo.edu/policies/academic/graduate/> As a student in this course and enrolled at The University of Toledo you should be familiar with the policies that govern the institution's academic processes, for example, Academic Dishonesty, Enrollment Status, and Grades and Grading. Please read :

COURSE EXPECTATIONS

Students are expected to attend all lab exercises, complete and submit the lab reports within a week and complete the final project prior to the week of final exams. Any exceptions must be brought to the attention of the faculty in advance.

OVERVIEW OF COURSE GRADE ASSIGNMENT*

Lab reports (one for each lab) will be due each week following the completion of each lab. 70% of the grade will be due to lab report grades.

During the course students will be assigned a project designed to introduce them to the use of imaging, image fusion, contouring and treatment planning design. The project is 15% of the grade.

A final examination will test the concepts learned during the lab exercises. Questions will be based on the topics covered in the lab and the task group reports discussed. The final exam is 15% of the grade.

UNIVERSITY POLICIES*

Policy Statement on Non-Discrimination on the Basis of Disability (ADA).

The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance](#). Students can find this policy along with other university policies listed by audience on the [University Policy webpage](#) (<http://www.utoledo.edu/policies/audience.html/#students>).

Academic Accommodations

The University of Toledo embraces the inclusion of students with disabilities. We are committed to ensuring equal opportunity and seamless access for full participation in all courses. For students who have an accommodations memo from Student Disability Services, I invite you to correspond with me as soon as possible so that we can communicate confidentially about implementing accommodations in this course. For students who have not established affiliation with Student Disability Services and are experiencing disability access barriers or are interested in a referral to healthcare resources for a potential disability or would like information regarding eligibility for academic accommodations, please contact the [Student Disability Services Office](#) (<http://www.utoledo.edu/offices/student-disability-services/>) by phone: 419.530.4981 or email at StudentDisability@utoledo.edu.



ACADEMIC AND SUPPORT SERVICES*

Please follow this link to view a comprehensive list of [Student Academic and Support Services](http://www.utoledo.edu/studentaffairs/departments.html) (http://www.utoledo.edu/studentaffairs/departments.html) available to you as a student.

SAFETY AND HEALTH SERVICES FOR UT STUDENTS*

Please use the following link to view a comprehensive list [Campus Health and Safety Services](#) available to you as a student.

INCLUSIVE CLASSROOM STATEMENT

In this class, we will work together to develop a learning community that is inclusive and respectful. Our diversity may be reflected by differences in race, culture, age, religion, sexual orientation, gender identity/expression, socioeconomic background, and a myriad of other social identities and life experiences. We will encourage and appreciate expressions of different ideas, opinions, and beliefs so that conversations and interactions that could potentially be divisive turn, instead, into opportunities for intellectual and personal development.

COURSE SCHEDULE*

WEEK	DATES	TOPIC	LEARNING OUTCOME(S)	ASSIGNMENTS DUE
1	8/24	Photon Output Factors	Ability to measurement the photon output of the linac for a given energy as a function of field size utilizing a 2D water phantom	Class time the following week
2	8/31	Electron Output Factors	Ability to measurement the electron output of the linac for a given energy as a function of field size. Ability to measurement effect of SSD on output.	Class time the following week
3	9/7	TG-51	Ability to perform an absolute output measurement in water following the guidelines set forth in TG-51 for various photon and electron energies.	Class time the following week
4	9/14	Using the Wellhofer Scanning water phantom	Ability to acquire accurate beam profiles in the inline, crossline and depth directions for a photon and electron beam utilizing a 3D scanning water phantom	Class time the following week
5	9/21	Stereotactic Radiosurgery using an Invasive Head Frame	Learn the importance of end-to-end testing and the use of stereotactic radiosurgery utilizing an anthropomorphic phantom.	Class time the following week
6	9/28	Unplanned Treatment	Learn when unplanned would be utilized in a clinic	Class time the following week

			setting and how they can be accomplished.	
7	10/5	Monthly <i>TrueBeam</i> output and mechanical QA	Ability to perform standard quality assurance tests on a linac, as set forth by TG-142, concentrating on the dosimetric and mechanical properties of the machine	Class time the following week
8	10/12	IMRT QA	Learn how to perform a patient –specific IMRT QA utilizing a diode array phantom	Class time the following week
9	10/19	CT-Sim QA	Class time the following week	Class time the following week
10	10/26	IGRT – using on-board imaging	Ability to perform standard quality assurance tests on a linac, as set forth by TG-142, concentrating on the on-board imaging properties of the machine	Class time the following week
11	11/2	In-Vivo dosimetry OSLD	Learn how in-vivo dosimetry is performed in a clinical setting	Class time the following week
12	11/9	Project: Contouring, Image Fusion and treatment planning	Learn the basic skills of designed a patient treatment from simulation to delivery.	Class time the following week
13	11/16	Final exam		