IMPORTANT: This syllabus form should be submitted to OAA (gsbs_academic_affairs@uth.tmc.edu) a week before the start of each semester.

NOTE to STUDENTS: If you need any accommodations related to attending/enrolling in this course, please contact of the Graduate School's 504 Coordinator Dr. Natalie Sirisaengtaksin. We ask that you notify GSBS in advance (preferably at least 3 days before the start of the semester) so we can make appropriate arrangements.

Term and Year**: Spring 2025** Course Number and Course Title: **GS02 1053: Radiation Detection, Instrumentation, and Data Analysis** **Credit Hours: 3** Meeting Location: **MD Anderson Cancer Center** Building/Room#: **ERD1.305** WebEx/Zoom Link**: N/A**	**Program Required Course: Yes** **Approval Code: No** **Audit Permitted: Yes** **Classes Begin: January 13, 2025** **Classes End: May 5, 2025** **Final Exam Week: May 7, 2025**

Class Meeting Schedule

Day	Time
Mon / Wed	**3-4 PM**

Course Director

Name and Degree: **Mallory Glenn, PhD**

Title: **Assistant Professor**

Department: **Radiation Physics**

Institution: ***MDACC***

Email Address: **mcglenn@mdanderson.org**

Contact Number: **713-563-5410**

NOTE: Office hours are available by request. Please email me to arrange a time to meet.

Instructors

1. **Stephen Kry, PhD**
   Institution: MDACC
   Email Address: sfkry@mdanderson.org
2. **Rebecca Howell, PhD**
   Institution: MDACC
   Email Address: rhowell@mdanderson.org
3. **Paige Taylor, PhD**
   Institution: MDACC
   Email Address: pataylor@mdanderson.org
4. **Uwe Titt, PhD**
   Institution: MDACC

	Email Address: utitt@mdanderson.org 5. **Xiaochun Wang, PhD** Institution: MDACC Email Address: xiaochunw@mdanderson.org 6. **Ramesh Tailor, PhD** Institution: MDACC Email Address: rtailor@mdanderson.org 7. **Song Gao, PhD** Institution: MDACC Email Address: songgao@mdanderson.org 8. **Christopher Walker, PhD** Institution: MDACC Email Address: cmwalker@mdanderson.org 9. **Chris Peeler, PhD** Institution: MDACC Email Address: crpeeler@mdanderson.org

Course Description:
This course explores applications of radiation detection and measurement pertaining to radiation therapy, diagnostic imaging, and nuclear medicine. Students will obtain a base knowledge of principles, technologies, and methods used to detect and measure ionizing radiation.

Textbook/Supplemental Reading Materials (if any)

- Radiation Detection and Measurement. Glenn F. Knoll 4th edition (2010). ISBN: 0470131489
- Introduction to Radiological Physics and Radiation Dosimetry. Frank H. Attix; (1991) ISBN: 978-0-471-01146-0
- Physics of Radiology. Harold E. Johns and John R. Cunningham
- Radiation Therapy Dosimetry: A Practical Handbook. Arash Darafsheh (2021).
- AAPM Task Group Reports and manuscripts relevant to course topics

Course Objective/s:
Upon successful completion of this course, students will obtain a base knowledge of principles, technologies, and methods used to detect and measure ionizing radiation.

***Specific Learning Objectives*:**

1. Learn the basic theory of several common radiation detectors used in radiation therapy and medical imaging.
2. Learn the clinical considerations for the use of several common detectors.
3. Learn to identify the strengths and limitations of common detectors in order to most appropriately select the detector suited for its application.
4. Understand how to treat patients correctly by using the right detector (see objective 3).

Student responsibilities and expectations:

Students enrolled in this course will be expected to:

1. Attend in-person lectures and laboratories.
2. Prepare written lab reports based upon laboratory exercises.
3. Prepare for and take course quizzes based on course lectures and readings.
4. Contribute to one group project exploring radiation detectors and principles for clinical use.
5. Prepare for and take one midterm and one final examination based on lectures and reading materials.

Students are expected to complete all assigned reading material prior to class. While you may work and discuss all course materials and assignments in groups, all writing assignments must be your own. Plagiarism and failure to properly cite scientific literature and other sources will not be tolerated and are grounds for dismissal from the course and further GSBS disciplinary action. Cheating or engaging in unethical behavior during examinations (quizzes and final) will be grounds for dismissal from the course without credit and further GSBS disciplinary action.

Grading System: **Letter Grade (A-F)**

Student Assessment and Grading Criteria : *(May include the following:)*

Percentage	Description
Homework & Quiz (10 %)	
Class Project (15 %)	
Midterm Exam (25 %)	One (1) Midterm Exam
Final Exam (25 %)	
Laboratory (25 %)	

C LASS SCHEDULE

Date		Time	Location	Instruct.	Topic
Mon	January 13, 2025	3:00 - 4:00 PM	ERD 1.305	-	Introduction & Counting Statistics
Wed	January 15, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Basic Detection and Detectors
Mon	January 20, 2025	-	-	-	No Class - MLK Day
Wed	January 22, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Ion Chamber Theory
Mon	January 27, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Ion Chambers I
Wed	January 29, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Ion Chambers II
Mon	February 3, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Proportional Counters
Wed	February 5, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	GM Counters and Survey Meters
Mon	February 10, 2025	3:00 - 4:00 PM	ERD 1.305	Taylor	Microdosimetry I
Wed	February 12, 2025	3:00 - 4:00 PM	ERD 1.305	Taylor	Microdosimetry II
Mon	February 17, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Luminescence Theory
Wed	February 19, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Thermoluminescent Dosimetry
Mon	February 24, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Optically Stimulated Luminescent Dosimeters
Wed	February 26, 2025	3:00 - 4:00 PM	ERD 1.305	Kry	Traceability for Dosimetry
Wed	February 26, 2025	**6:00 - 8:00 PM**	TBD	Tailor/Gao	Ion Chambers Lab
Mon	**March 3, 2025**	**3:00 - 4:00 PM**	**ERD 1.305**	**Glenn**	**Exam I**
Wed	March 5, 2025	-	-	-	No Class
Mon	March 10, 2025	-	-	-	Spring Break
Wed	March 12, 2025	-	-	-	Spring Break
Mon	March 17, 2025	-	-	-	No Class
Wed	March 19, 2025	1:00 - 4:00 PM	ERD 1.305	Glenn	Luminescent Dosimeter Lab
Mon	March 24, 2025	3:00 - 4:00 PM	ERD 1.305	Kry	Small Field Dosimetry
Wed	March 26, 2025	3:00 - 4:00 PM	ERD 1.305	Glenn	Clinical Applications and Novel Dosimeters
Mon	March 31, 2025	3:00 - 4:00 PM	FCT 14.5059	Peeler	Diodes
Wed	April 2, 2025	3:00 - 4:00 PM	FCT 14.5059	Titt	Photomultiplier Tubes and Photodiodes
Mon	April 7, 2025	3:00 - 4:00 PM	FCT 14.5059	Titt	Scintillation - Inorganic
Wed	April 9, 2025	3:00 - 4:00 PM	FCT 14.5059	Titt	Scintillation - Organic
Mon	April 14, 2025	3:00 - 4:00 PM	FCT 14.5059	Titt	Solid State Detectors
Mon/Tue	April 7-8, 2025	5:00 - 7:00 PM	TBD	Walker	NaI Lab
Wed	April 16, 2025	3:00 - 4:00 PM	FCT 14.5059	Wang	Film Dosimetry Principles
Mon/Tue	April 14-15, 2025	5:00 - 7:00 PM	TBD	Walker	Positron Detection Lab
Wed	April 23, 2025	3:00 - 4:00 PM	TBD	Tailor/Gao	Film Lab
Mon	April 28, 2025	3:00 - 4:00 PM	ERD 1.305	Howell	Neutron Interactions
Wed	April 30, 2025	3:00 - 4:00 PM	ERD 1.305	Howell	Neutron Detection
Mon	May 5, 2025	3:00 - 4:00 PM	ERD 1.305	Howell	Project Presentations
Wed	**May 7, 2025**	**3:00 - 4:00 PM**	**ERD 1.305**	**Glenn/Howell**	**Exam II**

Course Information and Policies

Class Location
Classes will occur in-person, per GSBS policies. Most classes will be held at the El Rio Campus (ERD), which houses IROC Houston and Radiation Dosimetry Services, located at:

8060 El Rio Street, Houston, TX, 77054

It is recommended that students commute to the building either via carpooling or utilizing the By Request Shuttle service with MD Anderson. By Request Shuttle hours are Monday through Friday, 8 a.m. to 5 p.m. Call **713-792-2338** to request service. When using the shuttle, request to be dropped off at "El Rio 2."

Should an extenuating circumstance prevent in-person attendance on a given day, please discuss with instructors to determine if accommodations can be made.

Communications & Class Documents
Updates regarding course content, resources, and scheduling will be available via Microsoft Teams. Important updates and reminders will be shared via Teams and e-mail.

Homework
Homework will consist of problems assigned from the professor(s). Each homework assignment will have an assigned due date. 10 points will be deducted for every day past due date. Please note that not all professors will assign homework.

Quizzes
Quizzes may not be announced. They may cover material from the previous lecture(s) or any reading assignments. Please note that not all professors will give quizzes. In general, there will be no make-up quizzes if absent on the date quizzes are administered.

Exams
Two (2) exams will be given this semester (not comprehensive). Exams will cover all relevant lecture notes, book chapters assigned, class handouts, or other reading assignments. Only in the most extenuating circumstances will make-up exams be administered; arrangements should be made with the professor in advance (see absence policy below).

Class Project
One group project will be administered. Information regarding project objectives will be shared at a later date.

Requests for Grade Corrections/Changes
Any requests for corrections and/or changes concerning grading of quizzes, homework, or tests must be submitted within seven (7) days of the return of the graded work.

Absence Policy

If there is a valid reason for which you must miss a class or assignment due date, please notify the professor teaching the class (via e-mail). It will be at the discretion of each professor to accept/not accept late assignments without penalty or reschedule quizzes/exams.

Class Scheduling Disclosure

Please be aware that all professors participating in class instruction are clinical faculty and have work commitments and responsibilities outside their educational pursuits. Therefore, faculty may occasionally require flexibility in scheduling lectures and labs. All changes to course scheduling will be communicated promptly via email.