

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 one of the Graduate School's 504 Coordinators, Cheryl Spitzenberger or 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.

<p>Term and Year: Spring 2024</p> <p>Course Number and Course Title: GS02 1053: Radiation Detection, Instrumentation, and Data Analysis</p> <p>Credit Hours: 3</p> <p>Meeting Location: El Rio Street, Houston 77054</p> <p>Building/Room#: ERD1.305</p>	<p>Program Required Course: Yes</p> <p>Approval Code: No</p> <p>Audit Permitted: Yes</p> <p>Classes Begin: January 8, 2024</p> <p>Classes End: May 1, 2024</p> <p>Final Exam Week: May 1, 2024</p>
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Class Meeting Schedule

Day	Time
Mon / Wed	3-4 PM

<p>Course Director</p> <p>Name and Degree: Mallory Glenn, PhD</p> <p>Title: Assistant Professor</p> <p>Department: Radiation Physics</p> <p>Institution: MDACC</p> <p>Email Address: mcglenn@mdanderson.org</p> <p>Contact Number: 713-563-5410</p> <p>NOTE: Office hours are available by request. Please email me to arrange a time to meet.</p>	<p>Instructor/s</p> <ol style="list-style-type: none"> Name and Degree: Stephen Kry, PhD Institution: MDACC Email Address: sfkry@mdanderson.org Name and Degree: Rebecca Howell, PhD Institution: MDACC Email Address: rhowell@mdanderson.org Name and Degree: Paige Taylor, PhD Institution: MDACC Email Address: pataylor@mdanderson.org Name and Degree: Uwe Titt, PhD Institution: MDACC Email Address: utitt@mdanderson.org Name and Degree: Xiaochun Wang, PhD Institution: MDACC
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Email Address: xiaochunw@mdanderson.org

6. Name and Degree: **Ramesh Tailor, PhD**

Institution: MDACC

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7. Name and Degree: **Song Gao, PhD**

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8. Name and Degree: **Christopher Walker, PhD**

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9. Name and Degree: **Chris Peeler, PhD**

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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)** Pass/Fail

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 %)	

CLASS SCHEDULE

Date	Duration (Hour(s) taught by lecturer)	Lecture Topic	Lecturer(s)
January 8, 2024	3:00 - 4:00 PM	Introduction & Counting Statistics	-
January 10, 2024	3:00 - 4:00 PM	Basic Detection and Detectors	Glenn
January 15, 2024	-	No Class - MLK Day	-
January 17, 2024	-	No Class - Dr. Glenn out	-
January 22, 2024	3:00 - 4:00 PM	Basic Detection and Detectors	Kry
January 24, 2024	3:00 - 4:00 PM	Ion Chamber Theory	Glenn
January 26, 2024	3:00 - 4:00 PM	Ion Chambers I	Glenn
January 29, 2024	3:00 - 4:00 PM	Ion Chambers II	Glenn
January 31, 2024	3:00 - 4:00 PM	Proportional Counters	Kry
February 5, 2024	3:00 - 4:00 PM	GM Counters and Survey Meters	Glenn
February 7, 2024	3:00 - 4:00 PM	Traceability for Dosimetry	Kry
February 12, 2024	3:00 - 4:00 PM	Microdosimetry I	Taylor
February 14, 2024	3:00 - 4:00 PM	Microdosimetry II	Taylor
February 19, 2024	3:00 - 4:00 PM	Luminescence Theory	Glenn
February 21, 2024	3:00 - 4:00 PM	Thermoluminescent Dosimetry	Glenn
February 21, 2024	6:00 - 8:00 PM	Ion Chambers Lab	Taylor/Gao
February 26, 2024	3:00 - 4:00 PM	Optically Stimulated Luminescent Dosimeters	Glenn
February 28, 2024	1:00 - 4:00 PM	Luminescent Dosimeter Lab	Glenn
March 4, 2024	3:00 - 4:00 PM	Small Field Dosimetry	Kry
March 6, 2024	3:00 - 4:00 PM	Clinical Applications and Novel Dosimeters	Glenn
March 11, 2024	3:00 - 4:00 PM	Exam I	Glenn
March 13, 2024	3:00 - 4:00 PM	No Class	Glenn
March 18, 2024	-	Spring Break	-
March 20, 2024	-	Spring Break	-

March 25, 2024	3:00 - 4:00 PM	Photomultiplier Tubes and Photodiodes	Titt
March 27, 2024	3:00 - 4:00 PM	Scintillation - Inorganic	Titt
April 1, 2024	3:00 - 4:00 PM	Scintillation - Organic	Titt
April 3, 2024	3:00 - 4:00 PM	Solid State Detectors	Titt
April 8, 2024	3:00 - 4:00 PM	Diodes	Peeler
April 8-9, 2024	5:00 - 7:00 PM	Nal Lab	Walker
April 10, 2024	3:00 - 4:00 PM	Film Dosimetry Principles	Wang
April 15-16, 2024	5:00 - 7:00 PM	Positron Detection Lab	Walker
April 17, 2024	3:00 - 4:00 PM	Film Lab	Taylor/Gao
April 22, 2024	3:00 - 4:00 PM	Neutron Interactions	Howell
April 24, 2024	3:00 - 4:00 PM	Neutron Detection	Howell
April 29, 2024	3:00 - 4:00 PM	Project Presentations	Howell
May 1, 2024	3:00 - 4:00 PM	Exam II	Glenn/Howell

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](https://www.google.com/maps/place/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.