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.

Term and Year: **Summer 2024** Course Number and Course Title: **GS02 1133: Introduction to Radiation Protection** **Credit Hours: 3** Meeting Location: **MDA, Pickens Towers** Building/Room#: **FCT8.6091** WebEx/Zoom Link: **N/A**	**Program Required Course: Yes** **Approval Code: Yes** **(If yes,** the Course Director or the Course Designee will provide the approval code.) **Audit Permitted: Yes** **Classes Begin: May 20, 2024** Classes End: **August 9, 2024** Final Exam Week: **August 12 – 15, 2023**

Class Meeting Schedule

Day	Time
Tuesday, Thursday	**2:00 – 3:30 pm**

Course Director Name and Degree: **Rajat Kudchadker, PhD** Title: **Professor** Department: **Radiation Physics** Institution: **MDACC** Email Address: rkudchad@mdanderson.org Contact Number: **832-829-0651** **Course Co-Director/s:** N/A **NOTE:** Office hours are available by request. Please email me to arrange a time to meet. **Teaching Assistant**: **N/A**	**Instructor/s** 1. **Julieanne Pollard-Larkin, PhD** Institution: MD Anderson Cancer Center Email Address: jmpollard@mdanderson.org 2. **Thomas Nishino, PhD** Institution: MD Anderson Cancer Center Email Address: tnishino@mdanderson.org 3. **S. Cheenu Kappadath, PhD** Institution: MD Anderson Cancer Center Email Address: skappadath@mdanderson.org 4. **Rachel Barbee, PhD** Institution: MD Anderson Cancer Center Email Address: rbarbee@mdanderson.org

5. **Richard (Bud) Wendt, Jr., PhD**

Institution: MD Anderson Cancer Center

Email Address: rwendt@mdanderson.org

5. **Rajat Kudchadker, PhD**

Institution: MD Anderson Cancer Center

Email Address: rkudchad@mdanderson.org

Course Description: This course is designed to present an overview of the basic principles of radiation protection as it applies to Radiation Therapy and Diagnostic Imaging. This includes covering the responsibilities of the physicist to patients, personnel, and general public that will guide physicists to practice safety procedures in their respective workplace. The course also studies methods and devices used for protection from ionizing radiation.

Textbook/Supplemental Reading Materials (if any)

- NCRP Report 151 – Structural shielding design and evaluation for megavoltage x- and gamma ray radiotherapy facilities
- NCRP Report 147 – Structural shielding design for medical x-ray imaging facilities
- Shielding Techniques for Radiation Oncology Facilities: Melissa Martin and Patton H. McGinley – Medical Physics Publishing.
- Health Risks from exposure to low levels of ionizing radiation Beir VII: National Research Council of the National Academics
- Exposure of the Pregnant Patient to Diagnostic Radiations: A guide to medical management 2nd Ed.: Louis K Wagner

Course *Specific Learning Objectives*:

Upon successful completion of this course, students will:

1. Demonstrate knowledge in Radiation Safety and Radiation Protection aspects.
2. Define and explain radiation safety dose limits, radiation safety door signs, regulations and ALARA principle.
3. Design linear accelerator vault shielding and evaluate megavoltage radiotherapy aspects.
4. Demonstrate expertise in CT radiation safety and shielding.

5. Design and evaluate structural shielding for medical x-ray imaging facilities.
6. Demonstrate expertise in nuclear medicine and PET radiation safety and shielding design.

Student responsibilities and expectations:
Students enrolled in the course will be expected to perform the following activities each week.

1. Read, process, and review study material covered in class weekly.
2. Review references suggested in class.
3. Prepare for and take quizzes, tests, exams based on course lectures/readings.
4. Attend and participate in any labs/demonstrations offered in the course.
5. Participate in and contribute to course discussions during lectures and review sessions.
6. Prepare for and take a final examination based on the lectures and suggested references.
7. Complete homework and projects in a timely manner by the deadline provided by the instructors.

Students are expected to complete all assigned reading material (reviews and research literature) 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**

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

Percentage	Description
Homework (20%)	Homework problems and conceptual questions to be worked on by students.
Quiz (5 %)	Quizzes to test student review and material understanding.
Shielding Project (5 %)	Linac vault shielding project
Midterm Exams (30%)	Midterm exam will cover all material taught till the midterm exam.
Final Exam (40%)	Final exam will be comprehensive over all material taught during the course.

CLASS SCHEDULE

Date	Duration (Hour(s) taught by lecturer)	Lecture Topic	Lecturer/s
05-21-2024	1.5	Introduction and Basic Concepts of Radiation Protection / Radiation Accidents	Rajat Kudchadker, PhD
05-23-2024	1.5	Interaction Physics as Applied to Radiation Protection	Julianne Pollard-Larkin, PhD
05-28-2024	1.5	Radiation Protection Organizations / 10CFR20 / 10CFR35 / NCRP / NRC / IAEA / ICRP	Julianne Pollard-Larkin, PhD
05-30-2024	1.5	MDACC Radiation Safety Program / Radioactive transportation / Personnel Monitoring	Julianne Pollard-Larkin, PhD
06-04-2024	1.5	Radiation Detection and Survey Instrumentation	Rajat Kudchadker, PhD
06-06-2024	1.5	Radiological quantities and dose limits	Rajat Kudchadker, PhD
06-11-2024	1.5	Radiation Therapy shielding - NCRP 151 Part I	Rajat Kudchadker, PhD
06-13-2024	1.5	Radiation Therapy shielding - NCRP 151 Part II	Rajat Kudchadker, PhD
06-18-2024	1.5	Radiation Therapy shielding - NCRP 151 Part III	Rajat Kudchadker, PhD
06-20-2024	1.5	Brachytherapy Radiation Protection concepts and shielding	Rajat Kudchadker, PhD
06-25-2024	1.5	Shielding vendor perspective	Rajat Kudchadker, PhD
06-27-2024	2.0	**Mid Term Exam**	Rajat Kudchadker, PhD
07-02-2024	1.5	Fetal and Pacemaker Radiation Protection	Julianne Pollard-Larkin, PhD
07-09-2024	1.5	CT Shielding Design and Fetal Dosimetry	S. Cheenu Kappadath, PhD
07-11-2024	1.5	CT dosimetry and Patient dose	S. Cheenu Kappadath, PhD
07-16-2024	1.5	Nuclear Medicine Radiation Protection concepts/Patient release/Fetal dosimetry	Barbee Rachel, PhD
07-18-2024	1.5	Nuclear Medicine – PET Shielding	Barbee Rachel, PhD
07-30-2024	1.5	Nuclear Medicine – Pet/CT Workshop	Richard Wendt, PhD
08-01-2024	1.5	RF shielding problem review and discussion	Thomas Nishino, PhD
08-06-2024	1.5	NCRP-147 / RF Shielding problem	Thomas Nishino, PhD
08-08-2024	1.5	Fetal dose calculations for RF	Thomas Nishino, PhD
08-13-2024	3.0	**Final Exam**	Rajat Kudchadker, PhD

RK/jal