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 2023** 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 15, 2023** Classes End: **August 10, 2023** Final Exam Week: **August 7 – 11, 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:** (if any) Name and Degree: **N/A** Title: Department: Institution: *UTH* *MDACC* Email Address: Contact Number: **NOTE:** Office hours are available by request. Please email me to arrange a time to meet.	**Instructor/s** 1. **Rajat Kudchadker, PhD** Institution: MD Anderson Cancer Center Email Address: rkudchad@mdanderson.org 2. **Surendra Prajapati, PhD** Institution: MD Anderson Cancer Center Email Address: sprajapati1@mdanderson.org 3. **Thomas Nishino, PhD** Institution: MD Anderson Cancer Center Email Address: tnishino@mdanderson.org 4. **S. Cheenu Kappadath** Institution: MD Anderson Cancer Center Email Address: skappadath@mdanderson.org 5. **Richard Wendt III, PhD** Institution: MD Anderson Cancer Center Email Address: rwendt@mdanderson.org

	6. **Rachel Barbee, PhD** Institution: MD Anderson Cancer Center Email Address: rbarbee@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 the 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:

- 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 Objective/s:
Upon successful completion of this course, students will...

***Specific Learning Objectives*:**

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, and 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.

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

Percentage	Description
Homework (20 %)	Homework problems and conceptual questions are 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
05-16-2023	1.5	Introduction and Basic Concepts of Radiation Protection / Radiation Accidents	Kudchadker Rajat, PhD
05-18-2023	1.5	Interaction Physics as Applied to Radiation Protection	Prajapati Surendra, PhD
05-23-2023	1.5	Radiation Protection Organizations / 10CFR20 / 10CFR35 / NCRP / NRC / IAEA / ICRP	Prajapati Surendra, PhD
05-25-2023	1.5	MDACC Radiation Safety Program / Radioactive Transportation / Personnel Monitoring	Prajapati Surendra, PhD
05-30-2023	1.5	Radiation Detection and Survey Instrumentation	Kudchadker Rajat, PhD
06-01-2023	1.5	Radiological quantities and dose limits	Kudchadker Rajat, PhD
06-06-2023	1.5	Radiation Therapy shielding - NCRP 151 Part I	Kudchadker Rajat, PhD
06-08-2023	1.5	Radiation Therapy shielding - NCRP 151 Part II	Kudchadker Rajat, PhD
06-13-2023	1.5	Radiation Therapy shielding - NCRP 151 Part III	Kudchadker Rajat, PhD
06-15-2023	1.5	Brachytherapy Radiation Protection concepts and shielding	Kudchadker Rajat, PhD
06-20-2023	1.5	Shielding vendor perspective	Kudchadker Rajat, PhD
06-22-2023	1.5	Fetal and Pacemaker Radiation Protection	Kudchadker Rajat, PhD
06-27-2023	2.0	**Midterm Exam**	Kudchadker Rajat, PhD
06-29-2023	1.5	Nuclear Medicine Radiation protection concepts / Patient Release / Fetal dosimetry	Wendt Richard, PhD/ Barbee Rachel, PhD
07-06-2023	1.5	Nuclear Medicine - PET Shielding	Wendt Richard, PhD/ Barbee Rachel, PhD
07-11-2023	1.5	Nuclear Medicine - PET/CT workshop	Wendt Richard, PhD/ Barbee Rachel, PhD
07-13-2023	1.5	RF shielding problem review and discussion	Nishino Thomas, PhD
07-18-2023	1.5	NCRP - 147 / RF shielding problem	Nishino Thomas, PhD
07-20-2023	1.5	Fetal dose calculations for RF	Nishino Thomas, PhD
08-01-2023	1.5	CT Shielding and Fetal Dosimetry	Kappadath S, PhD

08-03-2023	1.5	CT dosimetry and Patient dose	Kappadath S, PhD
08-08-2023	3.0	**Final Exam**	Kudchadker Rajat, PhD

RK/jal