RADI 5005: Fundamentals of Radiation Dosimetry

Fall 2019

CLASS DAYS and TIME: Tuesday and Friday 1:00 – 2:15 p.m.

CLASSROOM: CTRC G254

COURSE FACULTY: Karl Rasmussen, Ph.D

OFFICE LOCATION and HOURS: CTRC G236 Contact for scheduling

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READ THIS DOCUMENT CAREFULLY - YOU ARE RESPONSIBLE FOR ITS CONTENTS.

COURSE DESCRIPTION AND OBJECTIVES

This course is designed to give the student a working knowledge of radiation dosimetry. dosimetry fundamentals,.

Students will be introduced to the fundamentals of radiation dosimetry for radiation sources. Topics include radiation physics, dosimetry quantities, interactions with matter, calculation techniques, cavity theory, calibration protocols, and the physical processes which make it possible to measure dose. Students will be graded based on their attendance of didactic lectures, homework assignments, and preparation for examinations.

Pre-requisites – None

Semester credit hours – 3 credit hours

By the end of this course, each student should be able to:

The student is able to demonstrate that they understand the physical principles of ionizing radiation.
The student is able to demonstrate that they understand basic radiation interactions.
The student is able to demonstrate that they understand exponential attenuation.
The student is able to demonstrate an understanding of radiation equilibrium and charged particle equilibrium.
The student is able to demonstrate that they understand radioactive decay.
The student is able to demonstrate an understanding of the interactions of X-rays with matter.
The student is able to demonstrate an understanding of the interactions of charged particles with matter.
The student is able to demonstrate an understanding of dosimetry fundamentals.
The student is able to demonstrate an understanding of calibration protocols, including TG-51.

COURSE ORGANIZATION

The main teaching modalities used in this course include:

1) Conventional didactic lectures

2) Classroom discussion

3) Supplemental reading material

Materials – See below

Computer Access – Many of the presentations are given in the common lecture format and are accompanied by Pdf converted PowerPoint slide files. You are responsible for all information included in the lecture materials. However, you should not assume that all testable lecture material is found only in the posted materials. That is, lectures may be expanded and enhanced during in-class presentations. So, take good notes because any information discussed in class is considered testable.

Reading Assignments – Required reading assignments will be assigned from the textbook and other materials and are never considered optional. Unless specifically noted by the instructor, anything in the required readings, whether emphasized in class or not, is considered testable on exams. Mandatory readings are primarily found in the required text book (see below). However, occasionally a reading assignment will be given that is posted online or sent to you via email attachment.

ATTENDANCE

In order to achieve the expected level of competency, students must be fully engaged. Therefore, attendance for every class session is expected. It is recognized that a student may occasionally arrive late to class due to unexpected traffic problems or inclement weather. However, chronic lateness is considered an unprofessional behavior that disrupts the learning environment for everyone else in the classroom.

TEXTBOOKS

Required: F.H. Attix, Introduction to Radiological Physics and Radiation Dosimetry.

Recommended: MW Kissick and S Fakhraei, Lectures on Radiation Dosimetry Physics

GRADING POLICIES AND EXAMINATION PROCEDURES

Testable material comes from 3 main sources: Lecture presentation, homework assignments and in class discussion. Final letter grades will be based on the following: Homeworks from each chapter from the textbook, midterm exam, and a Final exam. Each source will be equally weighted (33%).

Late Arrival to Exams: Exams and quizzes will be timed. If you arrive late to an exam, and are given permission to take the exam, you will not be given additional time to complete your test. If you arrive after another student has finished the exam and has departed the exam room, you will not be allowed to take the exam. If you miss an exam, you may be elgible for taking a make-up exam.

Make-up Examinations: A student who must miss a scheduled exam for a serious reason must request an excused absence from the Course Director. Acceptable "serious reasons" usually involve serious illness or injury to the student (doctor's excuse may be required) or the student's family member. Examples of unacceptable reasons include: Not prepared or incomplete studying, over-sleeping, hangover, heavy traffic or any travel delays, other appointments or scheduled professional or personal commitments.
If it is determined that missing an exam is justified, a make-up examination will be scheduled. The make-up exam will be given as soon as possible at a time designated by the Course Director. Any student who misses an exam and does not receive an excused absence **will receive a grade of zero for that exam**.

Grading System

Include a grading scale used to determine final grades, see example below

A = 90-100% B = 80-89% C = 70-79% F = < 69%

REQUESTS FOR ACCOMODATIONS FOR DISABILITIES

In accordance with policy 4.2.3, **Request for Accommodation Under the ADA and the ADA Amendments Act of 2008 (ADAAA)**, any student requesting accommodation must submit the appropriate request for accommodation under the American with Disabilities Act (ADA, form 100). to his/her appropriate Associate Dean of their School and a copy to the ADA Coordinator. Additional information may be obtained at http://uthscsa.edu/eeo/request.asp.

ACADEMIC INTEGRITY AND PROFESSIONALISM

Any student who commits an act of academic dishonesty is subject to discipline as prescribed by the UT System Rules and Regulations of the Board of Regents. Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an exam for another person, signing attendance sheets for another student, and any act designed to give unfair advantage to a student or the attempt to commit such an act. Additional information may be obtained at http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/

TITLE IX AT UTHSCSA

Title IX Defined:
Title of the Education Amendments of 1972 is a federal law that prohibits sex discrimination in education. It reads "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance."

University of Texas Health Science Center San Antonio's Commitment:
University of Texas Health Science Center San Antonio (UTHSCSA) is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UTHSCSA does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

In an emergency, victims of sexual abuse should call 911. For non-emergencies, they may contact UPD at 210-567-2800. Additional information may be obtained at http://students.uthscsa.edu/titleix/

EMAIL POLICY

Every student is issued a University e-mail address and account at the time of enrollment. As a matter of University Policy, communications between students and faculty that occur using the student's University e-mail address is considered official business. Therefore, students are expected to check their university email inboxes on a regular basis so that any announcements, instructions, or information regarding this course will be received in a timely way. Missed communications due to inadequate monitoring of incoming emails on the University's email server will never be a valid excuse for unsatisfactory academic progress.

USE OF RECORDING DEVICES

Recording of lectures and other learning activities in this course by any means (*e.g.*, video, audio, etc.) is only permitted if approved by the instructor or required for compliance with Americans with Disabilities Act (ADA).

ELECTRONIC DEVICES

Cell phones must be turned off during all class meetings and exams. Computers and electronic tablets are allowed only for participating in classroom activities (*e.g.*, viewing slides presented in lecture or conference materials). No texting, tweeting, emailing, web-surfing, gaming, or any use of electronic devices that is not directly connected with classroom activities is permitted.

TENTATIVE CLASS SCHEDULE

RADI 5005

Fundamentals of Radiation

FALL 2019

Student Learning Outcomes	Assessment Methods	Assessment Results	Analysis of Assessments	Changes/Improvements Made
Week 1 Lectures. The student is able to demonstrate that they understand the physical principles of ionizing radiation and basic radiation interactions.	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Minor slide edits to improve discussion of concepts
Week 2 Lectures. The student is able to demonstrate that they understand exponential attenuation, radiation equilibrium and charged particle equilibrium.	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 3 Lectures. The student is able to demonstrate an understanding of absorbed dose in radioactive media.	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 4 Lectures. The student is able to demonstrate that they understand radioactive decay.	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 5 Lectures The student is able to demonstrate an understanding of the interactions of X-rays with matter.	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 6 Lectures. The student is able to demonstrate an understanding of the interactions of charged particles with matter.	Homework and written exam.	grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 7 Lectures. The student is able to demonstrate an understanding of X Ray Production and quality	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 8 Lectures. The student is able to demonstrate an understanding of cavity theory.	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 9 Lectures. The student is able to demonstrate an understanding of dosimetry fundementals and Ionization Chambers	Homework.	Homework and quiz grades ranged from B to A evenly distributed	Students were able to demonstrate that they understood the concepts presented in the lectures	Same as above
Week 10 Lectures. The student is able to demonstrate an understanding of dosimetry fundamentals, dosimeters,	Homework.	Homework and quiz grades ranged from B to A evenly	Students were able to demonstrate that they understood the concepts presented in	Same as above

and historical calibration methods		distributed	the lectures	
Week 11 Lectures. The student is able to demonstrate an understanding of calibration protocols, including TG-51.	A written exam	grades ranged from B to A	Students were able to answer the exam questions and demonstrate proficiency in the concepts covered in the lectures and homework	Same as above