

**RADI 5025**  
**Radiation Biology & Molecular Oncology**

Fall 2019

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**CLASS DAYS and TIME:** Tuesday & Friday (8:00-9:30am)

**CLASSROOM:** CTRC Building - Grossman Plaza (G254)

**COURSE FACULTY:** Karl H Rasmussen, Ph.D. & Sang Lee, Ph.D.

**OFFICE LOCATION and HOURS:** By Appt. Office: G237

**EMAIL:** rasmussenk@uthscsa.edu

**TELEPHONE:** 7

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

#### **COURSE DESCRIPTION AND OBJECTIVES**

The course provides basic instruction in radiation biology and the response of biological systems to ionizing radiation. In addition, a basic introduction to the fundamentals of molecular oncology will be provided in the second half of the course.

**Pre-requisites** – None

**Semester credit hours** – 3

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

- Understand the basic principles of classical radiation biology.
- Understand the radiation biology principles related to radiation oncology
- Understand the basic concepts associated with molecular oncology

#### **COURSE ORGANIZATION**

**The main teaching modalities used in this course include:**

- 1) Conventional didactic lectures**
- 2) Classroom discussion**
- 3) Supplement 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 are posted in the schedule of class meetings (shown below) 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:** Hall EJ, Giaccia AJ. (2006). Radiology for the Radiologist, 6<sup>th</sup> edition. Lippincott Williams & Wilkins: New York (or any newer edition will also work)

**Recommended:** Steel GG. (2002). Basic Clinical Radiobiology, 3<sup>rd</sup> edition. Hodder Arnold: London (or any newer edition will also work)

## GRADING POLICIES AND EXAMINATION PROCEDURES

Testable material comes from 3 main sources: Lecture presentation, reading assignments and in class discussion. Final letter grades will be based on three multiple choice exams. Each exam will be equally weighted (33%).

**Late Arrival to Exams:** Exams 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 eligible 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/eoo/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**  
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<b>WEEK</b>	<b>TOPIC</b>	<b>Assignment</b>	<b>Instructor and Modality</b>
<b>Week 1</b>	Physics and Chemistry of Radiation Absorption	<b>Hall Ch. 1</b>	<b>Rasmussen</b>
	Cell cycle and radio-sensitivity	<b>Hall Ch. 4</b>	<b>Roth</b>
<b>Week 2</b>	Cell, Tissue, and Tumor Kinetics	<b>Hall Ch. 21</b>	<b>Roth</b>
	Cell survival curve; LET & RBE	<b>Hall Ch. 3</b>	<b>Rasmussen</b>
<b>Week 3</b>	Radiation protectors	<b>Hall Ch. 9</b>	<b>Roth</b>
	DNA strand breaks and chromosomal aberrations	<b>Hall Ch. 2</b>	<b>Vijay</b>
<b>Week 4</b>	Acute effects of total body irradiation	<b>Hall Ch. 8</b>	<b>Roth</b>
	Hereditary effects of radiation	<b>Hall Ch. 11</b>	<b>Vijay</b>
<b>Week 5</b>	Radiation damage repair and the dose-rate effect	<b>Hall Ch. 5</b>	<b>Rasmussen</b>
	Oxygen effects and re-oxygenation	<b>Hall Ch. 6</b>	<b>Shi</b>
<b>Week 6</b>	<b>Test 1</b>		
	Hyperthermia	<b>Hall Ch. 28</b>	<b>Shi</b>
<b>Week 7</b>	Alternatives in radiation modalities	<b>Hall Ch. 24</b>	<b>Rasmussen</b>
	Clinical Response of Normal Tissues	<b>Hall Ch. 19</b>	<b>Li</b>
<b>Week 8</b>	Time, dose and fractionation in radiotherapy	<b>Hall Ch. 22</b>	<b>Rasmussen</b>
	Effect of radiation on the embryo and fetus	<b>Hall Ch. 12</b>	<b>Shi</b>
<b>Week 9</b>	Dose-Response Relationship for Normal Tissues	<b>Hall Ch. 18</b>	<b>Rasmussen</b>
	Biological Equivalent Dose/Modeling in Fractionation	<b>Instructor Notes</b>	<b>Rasmussen</b>
<b>Week 10</b>	<b>Test 2</b>		
	Cell Cycle and Checkpoint Control I	<b>Instructor Notes</b>	<b>Renee Yew</b>
<b>Week 11</b>	Cell Cycle and Checkpoint Control II	<b>Instructor Notes</b>	<b>Renee Yew</b>
	Oncogene and Tumor Suppressor Gene I	<b>Instructor Notes</b>	<b>Liu, Zhijie</b>
<b>Week 12</b>	Oncogene and Tumor Suppressor Gene II	<b>Instructor Notes</b>	<b>Liu, Zhijie</b>
	Gene expression and cancer	<b>Instructor Notes</b>	<b>Tom Boyer</b>
<b>Week 13</b>	Cancer stem cells and cancer microenvironment	<b>Instructor Notes</b>	<b>Xu, Kexin</b>
	DNA Damage & Repair I	<b>Instructor Notes</b>	<b>Paul Hasty</b>
<b>Week 14</b>	DNA Damage & Repair II	<b>Instructor Notes</b>	<b>Eun Yong Shim</b>
	<b>Holiday</b>		
<b>Week 15</b>	DNA Damage & Repair III	<b>Instructor Notes</b>	<b>Sang Lee</b>
	<b>Test 3</b>		