

# Radiation Detection, Instrumentation, and Data Analysis Syllabus

## GS02 1053

### Class Objective

Provide the student a base knowledge of radiation detection as it pertains to radiation therapy, diagnostic imaging, and nuclear medicine.

### Course Instructors:

<b>Professors</b>	<b>e-mail</b>	<b>Office Location</b>
Stephen Kry, PhD (course director)	<a href="mailto:sfkry@mdanderson.org">sfkry@mdanderson.org</a>	ERD1.310 (El Rio Campus)
Rebecca Howell, PhD	<a href="mailto:rhowell@mdanderson.org">rhowell@mdanderson.org</a>	ERD1.201 (El Rio Campus)
Uwe Titt, PhD	<a href="mailto:utitt@mdanderson.org">utitt@mdanderson.org</a>	FCT8.5087 (Pickens Tower)
Xiaochun Wang, PhD	<a href="mailto:xiaochunw@mdanderson.org">xiaochunw@mdanderson.org</a>	FCT6.5052 (Pickens Tower)
Ramesh Tailor, PhD. (lab)	<a href="mailto:rtailor@mdanderson.org">rtailor@mdanderson.org</a>	FCT8.6068 (Pickens Tower)
Bill Erwin, M.S. (lab)	<a href="mailto:werwin@mdanderson.org">werwin@mdanderson.org</a>	CPB5.3319 (Cancer Prevention Building)
Cheenu Kappadath, PhD. (lab)	<a href="mailto:skappadath@mdanderson.org">skappadath@mdanderson.org</a>	CPB5.3309 (Cancer Prevention Building)
Fada Guan, PhD	<a href="mailto:fguan@mdanderson.org">fguan@mdanderson.org</a>	FCT8.5084 (Pickens Tower)
Julianne Pollard, PhD	<a href="mailto:jpollard@mdanderson.org">jpollard@mdanderson.org</a>	FCT6.5048 (Pickens Tower)

### Textbook, Mandatory

Radiation and Detection. Glenn F. Knoll 4<sup>th</sup> edition (2010). ISBN: 0470131489

### Supplemental Reading Material

1. Introduction to Radiological Physics and Radiation Dosimetry. Frank H. Attix; (1991) ISBN: 978-0-471-01146-0
2. Physics of Radiology. Harold E. Johns and John R. Cunningham
3. AAPM Task Group Reports and manuscripts relevant to course topics

### Grading

Laboratory	20%
Class Project	20%
Exams (25% each)	50%
<u>Quizzes and Homework</u>	10%
Total	100%

### Requests for Grade Corrections/Changes

Requests for corrections/changes concerning grading of quizzes, homework, or tests must be submitted within 7 days of the return of the graded work.

### Homework

Homework will consist of problems assigned from the professor. 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 date of a quiz.

**Exams:** Two 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).

**Absence Policies:** If there is a valid reason for which you must miss a class, 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.

## Spring 2020 Class Schedule

Date	Time	Location	Instructor	Topic
Monday, January 6, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	No class
Wednesday, January 8, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	Introduction and counting statistics
Monday, January 13, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	Basic detection and detectors
Wednesday, January 15, 2020	1:30 - 2:30 pm	FCT14.5060	Kry	Ion chamber theory
Friday, January 17, 2020	1:30 - 2:30 pm	FCT14.5061	Kry	Ion chamber theory
Monday, January 20, 2020	1:30 - 2:30 pm	FCT14.5062	Kry	MLK Day - No Class
Wednesday, January 22, 2020	1:30 - 2:30 pm	FCT14.5063	Kry	Ion chambers I
Friday, January 24, 2020	1:30 - 2:30 pm	FCT14.5064	Kry	Ion chambers II
Monday, January 27, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	No class
Wednesday, January 29, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	proportional counters
Wednesday, January 29, 2020	6 pm - complete	TBD	Taylor/Gao	Ion Chambers lab - Group I
Wednesday, January 29, 2020	6 pm - complete	TBD	Taylor/Gao	Ion Chambers lab - Group I
Monday, February 3, 2020	1:30 - 2:30 pm	FCT14.5059	Guan	Microdosimetry I
Wednesday, February 5, 2020	1:30 - 2:30 pm	FCT14.5059	Guan	Microdosimetry II
Friday, February 7, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	GM Counters and survey meters
Monday, February 10, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	Luminescence Theory
Wednesday, February 12, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	Thermoluminescent Dosimetry
Monday, February 17, 2020	1:30 - 2:30 pm	N/A	N/A	Presidents day - No Class
Wednesday, February 19, 2020	12:30 - 2:00	EI Rio	Kry	Luminescent Dosimetry Lab - Group 1
Wednesday, February 19, 2020	1:30 - 3:00	EI Rio	Kry	Luminescent Dosimetry Lab - Group 2
Friday, February 21, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	Optically Stimulated Luminescent Dosimeters
Monday, February 24, 2020	1:30 - 2:30 pm	N/A	N/A	No class
Wednesday, February 26, 2020	1:30 - 2:30 pm	N/A	N/A	no class
Monday, March 2, 2020	1:30 - 2:30 pm	FCT14.5059	Kry	FLEX DAY
Wednesday, March 4, 2020	1:30 - 3:00 pm	FCT14.5059	Kry	EXAM I
Monday, March 9, 2020	1:30 - 2:30 pm	FCT14.5059	Titt	Photomultiplier Tubes and Photodiodes
Wednesday, March 11, 2020	1:30 - 2:30 pm	FCT14.5059	Titt	Scintillation - Inorganic
Monday, March 16, 2020	1:30 - 2:30 pm	N/A	N/A	Spring Break - No Class
Wednesday, March 18, 2020	1:30 - 2:30 pm	N/A	N/A	Spring Break - No Class
Monday, March 23, 2020	1:30 - 2:30 pm	N/A	Titt	Scintillation - Organic
Wednesday, March 25, 2020	1:30 - 2:30 pm	N/A	Titt	Solid State Detectors
Monday, March 30, 2020	12:30 - 2:30	ACB6.1320	Erwin/Kappadath	Nal Lab - Group 1
Wednesday, April 1, 2020	12:30 - 2:30	ACB6.1320	Erwin/Kappadath	Nal Lab - Group 2
Monday, April 6, 2020	12:30 - 2:30	ACB6.1320	Erwin/Kappadath	Positron Detection Lab - Group 1
Wednesday, April 8, 2020	12:30 - 2:30	ACB6.1320	Erwin/Kappadath	Positron Detection Lab - Group 2
Monday, April 13, 2020	1:30 - 2:30 pm	FCT14.5059	Howell	Neutron Interactions
Wednesday, April 15, 2020	1:30 - 2:30 pm	FCT14.5059	Howell	Neutron Detection
Monday, April 20, 2020	1:30 - 2:30 pm	FCT14.5059	Pollard	Diodes
Wednesday, April 22, 2020	1:30 - 2:30 pm	FCT14.5059	Wang	Film Dosimetry Principles
Wednesday, April 22, 2020	6 pm - complete	TBD	Taylor/Gao	Film Lab - Group I
Wednesday, April 22, 2020	6 pm - complete	TBD	Taylor/Gao	Film Lab - Group 2
Monday, February 24, 2020	1:30 - 2:30 pm	FCT14.5059	Howell	Project Presentations
Wednesday, April 29, 2020	12:30 - 2:30 pm	FCT14.5059	Titt/Howell/Wang/Pollard	Exam II