Radiation Detection, Instrumentation, and Data Analysis Syllabus

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

Course Instructors:

<table>
<thead>
<tr>
<th>Professors</th>
<th>e-mail</th>
<th>Office Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stephen Kry, PhD (course director)</td>
<td><a href="mailto:sfkry@mdanderson.org">sfkry@mdanderson.org</a></td>
<td>ERD1.310 (El Rio Campus)</td>
</tr>
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<td>Rebecca Howell, PhD</td>
<td><a href="mailto:rhowell@mdanderson.org">rhowell@mdanderson.org</a></td>
<td>ERD1.201 (El Rio Campus)</td>
</tr>
<tr>
<td>Uwe Titt, PhD</td>
<td><a href="mailto:utitt@mdanderson.org">utitt@mdanderson.org</a></td>
<td>FCT8.5087 (Pickens Tower)</td>
</tr>
<tr>
<td>Xiaochun Wang, PhD</td>
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</tr>
<tr>
<td>Ramesh Tailor, PhD (lab)</td>
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</tr>
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<td>Song Gao, PhD (lab)</td>
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<td>FCT6.5044 (Pickens Tower)</td>
</tr>
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<td>Bill Erwin, M.S. (lab)</td>
<td><a href="mailto:werwin@mdanderson.org">werwin@mdanderson.org</a></td>
<td>CPB5.3319 (Cancer Prevention Building)</td>
</tr>
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<td>Cheenu Kappadath, PhD. (lab)</td>
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</tr>
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<td>Fada Guan, PhD</td>
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<td>FCT8.5084 (Pickens Tower)</td>
</tr>
<tr>
<td>Julianne Pollard, PhD</td>
<td><a href="mailto:jmpollard@mdanderson.org">jmpollard@mdanderson.org</a></td>
<td>FCT6.5048 (Pickens Tower)</td>
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Textbook, Mandatory

Supplemental Reading Material
2. Physics of Radiology, Harold E. Johns and John R. Cunningham
3. AAPM Task Group Reports and manuscripts relevant to course topics

Grading

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Laboratory</td>
<td>20%</td>
</tr>
<tr>
<td>Class Project</td>
<td>20%</td>
</tr>
<tr>
<td>Exams (25% each)</td>
<td>50%</td>
</tr>
<tr>
<td>Quizzes and Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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</table>

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.
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, January 11, 2021</td>
<td>1:30 - 2:00 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Introduction</td>
</tr>
<tr>
<td>Wednesday, January 13, 2021</td>
<td>-</td>
<td>Virtual</td>
<td>-</td>
<td>No Class. Enjoy.</td>
</tr>
<tr>
<td>Friday, January 15, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Counting statistics</td>
</tr>
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<td>Monday, January 18, 2021</td>
<td>-</td>
<td>Virtual</td>
<td>-</td>
<td>No Class - MLK</td>
</tr>
<tr>
<td>Wednesday, January 20, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Basic detection and detectors</td>
</tr>
<tr>
<td>Monday, January 25, 2021</td>
<td>-</td>
<td>Virtual</td>
<td>-</td>
<td>No Class. Enjoy.</td>
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<tr>
<td>Wednesday, January 27, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Ion chamber theory</td>
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<tr>
<td>Friday, January 29, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Ion chambers I</td>
</tr>
<tr>
<td>Monday, February 1, 2021</td>
<td>-</td>
<td>Virtual</td>
<td>-</td>
<td>No class. Enjoy.</td>
</tr>
<tr>
<td>Wednesday, February 3, 2021</td>
<td>TBD</td>
<td>Virtual</td>
<td>Tailor/Gao</td>
<td>Ion Chambers lab</td>
</tr>
<tr>
<td>Monday, February 8, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>proportional counters</td>
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<tr>
<td>Wednesday, February 10, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Guan</td>
<td>Microdosimetry I</td>
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<tr>
<td>Monday, February 15, 2021</td>
<td>-</td>
<td>Virtual</td>
<td>-</td>
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<tr>
<td>Wednesday, February 17, 2021</td>
<td>1:30 - 2:30 pm</td>
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<td>Guan</td>
<td>Microdosimetry II</td>
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<td>Monday, February 22, 2021</td>
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<td>Kry</td>
<td>GM Counters and survey meters</td>
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<tr>
<td>Wednesday, February 24, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Luminescence Theory</td>
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<tr>
<td>Monday, March 1, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Thermoluminescent Dosimetry</td>
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<tr>
<td>Wednesday, March 3, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Optically Stimulated Luminescent Dosimeters</td>
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<tr>
<td>Friday, March 5, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Kry</td>
<td>Luminescent Dosimetry Lab</td>
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<tr>
<td>Monday, March 8, 2021</td>
<td>1:30 - 2:30 pm</td>
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<td>Kry</td>
<td>Small field dosimetry</td>
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<td>Wednesday, March 10, 2021</td>
<td>1:30 - 3:00 pm</td>
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<td>Kry</td>
<td>Exam 1</td>
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<td>Monday, March 15, 2021</td>
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<td>Virtual</td>
<td>-</td>
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<tr>
<td>Wednesday, March 17, 2021</td>
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<td>Virtual</td>
<td>-</td>
<td>No Class. Spring Break.</td>
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<tr>
<td>Monday, March 22, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Titt</td>
<td>Photomultiplier Tubes and Photodiodes</td>
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<tr>
<td>Wednesday, March 24, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Titt</td>
<td>Scintillation - Inorganic</td>
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<tr>
<td>Monday, March 29, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Titt</td>
<td>Scintillation - Organic</td>
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<tr>
<td>Wednesday, March 31, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Titt</td>
<td>Solid State Detectors</td>
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<td>Monday, April 5, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Erwin/Kappadath</td>
<td>Nal Lab</td>
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<tr>
<td>Wednesday, April 7, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Erwin/Kappadath</td>
<td>Positron Detection Lab</td>
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<td>Monday, April 12, 2021</td>
<td>1:30 - 2:30 pm</td>
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<td>Howell</td>
<td>Neutron Interactions</td>
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<td>Wednesday, April 14, 2021</td>
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<td>Howell</td>
<td>Neutron Detection</td>
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<tr>
<td>Monday, April 19, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Pollard</td>
<td>Diodes</td>
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<tr>
<td>Wednesday, April 21, 2021</td>
<td>1:30 - 2:30 pm</td>
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<td>Wang</td>
<td>Film Dosimetry Principles</td>
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<td>Monday, April 26, 2021</td>
<td>TBD</td>
<td>Virtual</td>
<td>Tailor/Gao</td>
<td>Film Lab</td>
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<td>Wednesday, April 28, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Howell</td>
<td>Project Presentations</td>
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<tr>
<td>Monday, May 3, 2021</td>
<td>1:30 - 2:30 pm</td>
<td>Virtual</td>
<td>Titt/Howell/Wang/Pollard</td>
<td>Exam II</td>
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</tbody>
</table>