CEM985 - Radiation Detection and Measurement- Fall 2019

Class Meetings

Tuesdays and Thursdays from 8:30 to 10:00 AM in 1309 NSCL/Cyclotron Building

Instructor

D.J. Morrissey
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Office: 1247-A Cyclotron
Office Hours: by appointment

Target Audience

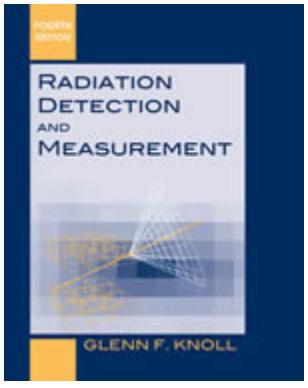
The course is geared towards early-career graduate students in nuclear science. Enrollment is open to graduate students in the Colleges of Natural Science and in Engineering. Advanced undergraduate students can enroll based on the results of an interview with the instructor.

Course Description

The lectures will generally follow the material presented in the textbook by G. Knoll. The course will focus on detailed presentations of signal generation in a wide range of radiation detectors used in modern nuclear science, including the subsequent signal processing all the way to the digital recording (the last subject is beyond the scope of the textbook). A short detour to establish the fundamentals of modern vacuum technology will be included. A lecture by lecture syllabus is available and copies of the lecture notes will be published online along with other course material.

Textbook

Glenn F. Knoll, *Radiation Detection and Measurement*, 4th Edition (J. Wiley and Sons, 2o1o)



Exams, Homework and Course Grade

The grade for the course will be based on the scores on the two exams (25% and 50%, respectively) and from problem sets assigned during the course (25%).

Thursday, 10 October 2o15 **chapters 1--10 in textbook plus Vacuum Tech.**

Thursday, 5 December 2o15 **emphasis on chapters 13 -- 20, building on earlier course material**

Accommodations for Persons with Disabilities

Michigan State University is committed to providing equal opportunity for participation in all programs, services, and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at www.rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this to Prof. Morrissey at the start of the term and/or two weeks prior to the accommodation date. Requests received after this date may not be honored.

Proposed Lecture Schedule

CEM 985 Fall 2019 T Th 8:30 to 10:00 A.M. 1309 Cyclotron

Lecture	Date	Day	Topic	Chapter
1	Aug 29	Th	Radioactive Sources, units	Knoll Ch 1
2, 3	Sept 3,5	T, Th	Interaction of radiation with matter, SRIM Applications of radiation	Knoll Ch 2
4, 5	Sept 10,12	T, Th	Vacuum Systems: Measurement and Materials Vacuum Systems: Gas Flow, Production	Vacuum
6, 7	Sept 17,19	T, Th	Statistics, Data vs. Models, Time distribution General Properties of Radiation Detectors, **PS-1 due**	Knoll Ch 3, 4
8, 9	Sept 24,26	T, Th	Ion Chambers, Proportional and G-M Counters	Knoll Ch 5, 6 and 7
10	Oct 1	T	Cancelled	
11	Oct 3	Th	Principles of Scintillation, Organic/Inorganic materials Photon detection, **PS-2 due**	Knoll Ch 8
12	Oct 8	T	PMT amplification, Spectroscopy with Scintillation Detectors	Knoll Ch 9,10
13	Oct 10	Th	**Exam 1 on Thursday**	Exam 1
14, 15	Oct 15,17	T,Th	Semiconductor diodes, general Semiconductor diodes, Germanium	Knoll Ch 11, 12
16	Oct 22	T	Other semiconductor materials, Gamma-ray Backgrounds	Knoll Ch 13, 20
17	Oct 24	Th	[DNP Meeting in Crystal City, VA]	
18, 19	Oct 29,31	T, Th	Slow neutron detection, fast neutron detection **PS-3 due**	Knoll Ch 14, 15
20, 21	Nov 5,7	T, Th	Pulse processing, Passive circuits, Active circuits	Knoll Ch 16 parts a, b
22, 23	Nov 12,14	T, Th	Noise, Linear and Logic signal processing A & T to D conversion **PS-4 due**	Knoll Ch 17, 18 part a
24	Nov 19,21	T, Th	Multidimensional DAQ, Multidimensional detectors,	Knoll Ch 18 part b, c
	Nov 26	Tu	Miscellaneous Dets. **PS-5 due**	
25, 26	Nov 28	Th	Thanksgiving Break	Knoll Ch 19
27	Dec 3	T	Wrap Up	
28	Dec 5	Th	**Exam 2 on Thursday**	Exam 2