Course Syllabus MANE-4420

Course Information

RADIATION TECHNOLOGY		MANE 4420	Section 1
RPI Spring 2021	3 cr		
Lecture	MT	4:00PM-5:20PM	RCKTTS 212

Prerequisites or Other Requirements:

Nuclear Phenomena for Engineering Applications (MANE 2830).

Instructor

Professor Yaron Danon	danony@rpi.edu
Office Location: NUCENG 1-9	(518) 276-4008
Office Hours: W 10:00AM-11:55AM	www.rpi.edu/~danony

Teaching Assistant(s)

Name	Office	Office Hours	Email Address

Course Description

Radiation applications are used extensively in industry and research. This course gives an overview of the different applications of radiation and the technology involved. The material will cover radiation interaction and sources, detectors and counting statistics, radiotracers, charged particles, gamma rays applications, radiation transport for applications. Emphasis will be given on methods, measurement design and optimization. Applications include density measurements, X-Ray fluorescence, thickness gauging, determination of fluid properties, process characteristics and imaging.

Course Text(s)

None – handouts will be provided when needed

Additional References

1. G. C. Lowenthal, P.L Airey “Practical Applications of Radioactivity and Nuclear Radiation”, Cambridge University Press, 2001.
2. Glenn F. Knoll, “Radiation Detection and Measurements”, 2nd edition John Wiley and sons, 1989.
3. G Foldiak, “Industrial Applications of Radioisotopes”, Elsevier 1986.
4. Robin Gardner and Ralph L. Ely Jr. “Radioisotope Measurement Applications In Engineering”, Reinhold Publishing Corporation, 1967.

Course Goals / Objectives

The goals of the course are to familiarize the students with non-power applications of radiation and the analytical and design methods of such applications.

Course Content

Radiation Decay, Interaction of Radiation, Charged particles, Photon interaction, Neutron Interaction, Radiation sources, Radiation Detectors, Radiogauging, Static RG, Continues RG, Linear Response,, Radiogauging with alphas, Density measurements, Gauging with neutrons , Radiotracers, Radiometric, balance, Mixing and wear measurements, Radiography, Activation Analysis, RTG

Student Learning Outcomes

Students which successfully complete this course will be able to:

1. Describe and apply the fundamentals of radiation interactions.
2. Describe and apply applications of radiation sources and detectors.
3. Describe and apply the principles of radiation measurements.

4. Describe and apply different radiation applications in different industries.
5. Be able to analyze and design an industrial radiation application.

Course Assessment Measures

Assessment	Due Date	Learning Outcome #s
Homework	5	1, 2, 3, 4, 5
Project	1	5

Grading Criteria

Based on a weighted sum of the homework, and final project:
Final Grade=0.6 x (average homework grade) + 0.4 x (final Project grade)
Late homework submission will also result in grade reduction penalty.

The final grade is on a scale from 0 to 100. The final grade will be converted to a letter grade scale using the following table:

From	To	Final Grade
93	100	A
90	92	A-
87	89	B+
83	86	B
80	82	B-
77	79	C+

From	To	Final Grade
73	76	C
70	72	C-
60	69	D+
56	59	D
0	55	F

Attendance Policy

Regular attendance is strongly recommended.

Other Course Policies

Homework: Due one week after assigned.

Final project: The final project includes a project proposal to be submitted on November 2 and a final project presentation and report that will be submitted in the last week of classes. The projects topic can include design or analysis of a radiation application instrument, method or application.

Academic Integrity

Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own. Acts, which violate this trust, undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these. **In this class, all assignments that are turned in for a grade must represent the student's own work**. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your collaboration. Submission of any assignment that is in violation of this policy will result in a grade reduction penalty. Late homework submission will also result in grade reduction penalty (to be discuses during the first class). If you have any question concerning this policy before submitting an assignment, please ask for clarification.

Diversity and Inclusion

At RPI we support an inclusive learning environment where diversity and individual differences are understood, respected, appreciated, and recognized as a source of strength. I expect that students, and faculty will respect differences and demonstrate diligence in understanding how other peoples' perspectives,

behaviors, and world views may be different from their own. Students in this class are encouraged to speak up and participate during class. Because the class will represent a diversity of individual beliefs, backgrounds, and experiences, every member of this class must show respect for every other member of this class.

COVID-19 Policies

In the in-person portion of the course we follow guiltiness provided by RPI at https://provost.rpi.edu/learning-assessment/course-syllabus/suggested-covid-19-syllabus-information . **A face mask is required at all times** with no exceptions. Students who refuse to wear masks appropriately or adhere to other stated requirements may face disciplinary action for Code of Conduct violations.