

Course Title AER E 429 X

Penetrating Radiation Methods in Nondestructive Evaluation

Prerequisites: PHYS 222

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Zoom, WebEx or Skype meeting information:

Course (Catalog) Description

Required Texts: Will be provide during the course

Specific course information:

Spectrum of electromagnetic waves, wave/particle dualism, generation and detection of electromagnetic radiation, reflection/ penetration/ absorption/ scattering of electromagnetic radiation, application of penetrating radiation (x- and gamma rays), imaging, computed tomography, diffraction, small angle scattering, materials characterization, NDE with neutrons and charged particles

Course Objectives

Course provides general knowledge about interaction between radiation and matter that is of general importance for Aerospace Engineering. An overview will help to understand the nature of EM radiation and techniques to generate and detect the radiation. Applications for NDE and materials characterization will be focused to ionizing radiation (x-ray and gamma-rays) will help preparing the students to solve tasks in research and industry.

General Education Learning Outcomes

1. Understand the nature of electromagnetic (EM) waves and wave-particle dualism
2. Understand the interaction of EM waves with matter in respect to the various wavelength and photon energies.
3. Understand the different methods for generation and detection of EM waves at different wavelengths/photon energies
4. Understand the principle of x-ray imaging, x-ray computed tomography (CT) and laminography
5. Understand diffraction of x-rays and application for materials characterization.
6. Understand the application of neutrons and charged particles for NDE
7. Be able to select a suitable technique to solve NDE or materials characterization tasks.

Course Procedures

This course will be delivered entirely online through the learning management system, Blackboard Learn. Students will use their Blackboard Learn accounts to login to the course, where weekly required readings and videos will be posted.

Students are expected to participate in all online activities as listed on the course calendar. To optimize the online learning environment students should be regularly and actively engaged on reading and responding to assigned materials and discussion topics.

Course Expectations

- This course will be delivered both in the classroom and online through the learning management system, Blackboard Learn. On-campus students are expected to attend class. Online students will use their Blackboard Learn accounts to login to the course, where lecture videos and all other course materials will be posted.
- Students are expected to participate in all activities listed on the course schedule. To optimize learning efficiency, students should be regularly and actively engaged both in the classroom and online.

There will be assigned seating for in-class quizzes and examinations. Online students may take quizzes and exams at one of the ISU testing centers or by identifying a local proctor to administer their tests. In the latter case, the proctor must be identified and approved by the end of the third week of class.

Potential proctors are required to fill out the online 'Off-Campus Proctor Application' form EACH semester. Online students: please work with your potential proctor to fill out the application form at <https://www-testing-las.sws.iastate.edu/oc-proctor/application> .

Grade Distribution

30 % Homework
30 % Mid-term Exams
10 % Presentation
30 % Final Exam

Grading Scale in%

94100	A	74-76.99	C
90-93.99	A-	70-73.99	C-
87-88.99	B+	67-69.99	D+
84-86.99	B	64-66.99	D
80-83.99	B-	60-63.99	D-
77-79.99	C+	and below	F

If you want to calculate your approximate grade, divide earned points by total possible points and multiply by 100. Look at the grading scale above to convert your percentage to a letter grade.

Library e-Reserve

How do I access the materials on reserve for my course?

You must enter your University ID and Library password (Set your Library password here: <http://www.lib.iastate.edu/myaccount-setpwd/6888>) to access Reserve materials.

What if my ID number does not work or I don't have an ID card?

You must have a valid ISU ID number to use Reserve. If you do not have a University ID card or the system sends you a message stating it is invalid, please contact the ISU Card Office, 0530 Beardshear Hall, 515-294-2727. Also, make sure you are only using the last 11 digits from your ISU card. Do not enter "600957" at the beginning.

Special Accommodations

Please address any special needs or special accommodations with your instructor the first day of class or as soon as you become aware of your needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) from the Disability Resources Office.

Student Disability Resources 1076 Student Services Building Ames, IA 50011-2222 Phone: 515 294-7220	Fax: 515 294-2397 TTY: 515 294-6635 E-mail: disabilityresources@iastate.edu Website: http://www.dso.iastate.edu/dr/
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