

ENU 4612L-Nuclear Radiation Detection and Instrumentation Lab (1 cr), Required Course, Fall, 2005

Description: Laboratory in nuclear radiation detection and instrumentation systems associated with ENU 4612.

Prerequisites: EEL 3003, EEL 3303L, and ENU 4605

Co-requisites: ENU 4612

Course Objectives: Provide students with a working knowledge of radiation detectors, detector systems, and their associated electronics; Introduce LabVIEW programming and its applications to radiation detection data acquisition; Development of communication skills including technical writing and oral presentations; Prepare students for independent research and/or design projects.

Program Educational Objectives / Professional Components Supported by Course:

1. Graduates will have successful careers in Nuclear Engineering and related disciplines.
2. Graduates will pursue continuing education or advanced degrees.
3. Graduates will communicate effectively and work collaboratively in Nuclear Engineering and related disciplines.
4. Graduates will use the knowledge and skills obtained in their undergraduate education to practice high ethical professional standards in Nuclear Engineering and related disciplines.

Program Outcomes Supported by Course:

- a. An ability to apply knowledge of mathematics, science, and engineering for problem solving in engineering
- b. b1. An ability to design and conduct experiments
b2. An ability to interpret data
- c. An ability to develop an engineering design to meet specific technical requirements within realistic constraints such as economic, environmental, health and safety, and reliability
- d. An ability to function on multi-disciplinary skills teams
- g. An ability to communicate effectively, using both oral and written assignments, in engineering practice
- k. An ability to use the techniques, skills, and modern engineering tools, including computational skills and tools, necessary for nuclear and radiological engineering practice
- l. An ability to apply advanced mathematics, science, atomic and nuclear physics and engineering to nuclear and radiological systems and processes
- m. An ability to measure and interpret measurements of nuclear and radiological processes
- n. An ability to work professionally in one or more areas of: nuclear power reactors, nuclear instrumentation and measurement, radiation protection and shielding, and radiation sources and applications

Text: Glenn F. Knoll, *Radiation Detection and Measurement*, 3rd Ed., John Wiley & Sons, Inc., 1999. (ISBN: 0-471-07338-5)

References: Nicholas Tsoulfanidis, *Measurement and Detection of Radiation*, 2nd Ed., Taylor and Francis, 1995.
Robert A. Day, *How to Write & Publish a Scientific Paper*, 5th Ed., Oryx Press, 1998.
G. G. Eichholz and J. W. Poston, *Principles of Nuclear Radiation Detection*, Ann Arbor Science, 1985.

Grading: Attendance (10%), Quizzes (10%), Worksheets (20%), Lab Notebook (10%), Short Reports (30%), Full Report of Lab #8 (20%)

ENU4612L Course Outline (Fall 2004)

Lab #0	<u>Course Introduction and Lab Safety</u>
Lab #1	<u>Oscilloscope Usage</u>
Lab #2	<u>Nuclear Instrument Electronics</u>
Lab #3	<u>Geiger-Mueller Detectors</u>
Lab #4	<u>Gas-Flow Proportional Counters</u>
Lab #5	<u>NaI Scintillation Detectors</u>
Lab #6	<u>Thermoluminescent Dosimeters</u>
Lab #7	<u>High Purity Ge Detectors</u>
Lab #8	<u>Neutron Activation Analysis</u>

Prepared by: James E. Baciak
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