

ENU 4612L
Nuclear Radiation Detection and Instrumentation Laboratory
Addendum to the Course Syllabus
Fall 2016

1. Laboratory Objectives

Provide students with a working knowledge of radiation detectors, detector systems, and their associated electronics. Develop communication skills including technical writing and oral presentations. Prepare students for independent research and/or design projects.

2. Instructor

Sasmit S. Gokhale
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3. Teaching Assistant

N/A

4. Meeting Location

125 Nuclear Science Building

5. Material and Supply Fees

N/A

6. Textbooks Required

Glenn F. Knoll, *Radiation Detection and Measurement*, 4th Ed., John Wiley & Sons, Inc., 1999

Access to Chart of Nuclides:

You will need access to a chart of nuclides during the course. Feel free to use any one of the numerous resources available (so long as it is accurate). Below are a couple of suggested chart of nuclides.

- I. Joseph R. Parrington, et al., *Nuclides and Isotopes*, 15th Ed., Lockheed Martin / GE Nuclear, 1996.
- II. <http://atom.kaeri.re.kr> (This is a website maintained by the Korea Atomic Energy Research Institute – Recommended)

7. Recommended Reading

- I. Nicholas Tsoufanidis, *Measurement and Detection of Radiation*, 2nd Ed., Taylor and Francis, 1995

8. Course Outline

Date	Lab Topic for that Week	Type of Report
September	6 Introduction and Lab Safety	
	13 Lab 1: Oscilloscope Usage	Worksheet, Quiz
	20 Lab 2: Nuclear Instrument Electronics	Worksheet, Quiz
October	4 Lab 3: Geiger-Mueller Detectors	Lab Report, Quiz
	11 Lab 4: Gas-Flow Proportional Counters	Worksheet, Quiz
	25 Lab 5: NaI Scintillation Detectors	Lab Report, Quiz
November	15 Lab 6: High-Purity Germanium Detectors	Worksheet, Quiz
	29 Lab 7: Neutron Detection	Worksheet, Quiz

9. Attendance and Expectations

Students are expected to attend **ALL** laboratory sessions. Students must participate in each laboratory exercise, including lab quizzes, and produce individual laboratory worksheets for every lab, along with two laboratory reports during the semester. Students may make up experiments provided that valid medical reason or previously excused reason. Students must perform **ALL** laboratory experiments in order to receive a passing grade.

10. Grading

Below is a breakdown of the assignments graded in the laboratory:

Lab Reports (2)	30%
Worksheets (4)	30%
Quizzes (7)	30%
Oral Presentation	10%

Lab Reports

You will be required to turn in 2 individual short lab reports (a short ~3 page tech memo) on Lab #3 (Geiger-Mueller) and (a longish ~10 page report) Lab #5 (NaI Scintillation). These lab reports will be due 10 days from the date that the lab was actually performed. Guidelines will be handed out describing what is expected to be included in these reports and the formatting style to be used.

Quizzes

A short quiz will be given at the beginning of every lab session (except for Lab 0). They will consist of 1-2 simple questions that will be taken from the lab information handout given before each session.

Worksheets

I will provide the worksheets and lab instruction handouts at the start of each lab session. These worksheets will consist of several questions that each student must answer individually on their own worksheets. At the end of the lab session, I will collect the worksheets for grading. The only exception to this will be on the two weeks where a short report is required and for the lab session that you choose to do an oral presentation on. On these 3 weeks you will hold on to the worksheets in order to use the data for your lab reports or PowerPoint slides. In total, I will grade 4 worksheets during the entire lab semester: everyone must hand in worksheets for Labs #1 and #2; two additional worksheets will be graded but will vary depending on which lab student selects to perform oral presentation for.

Oral Presentation

Every student must prepare a ~10 minute oral presentation on a selected lab session of your choice (can only select from Labs 4, 6, or 7). Guidelines will be given describing the grading breakdown and what is expected in the presentation. The presentation will be given to the instructor on a selected date.