

# **Nuclear Radiation Detection and Instrumentation Laboratory**

ENU 4612L

Class # 11871, 21937, 21938

**Class Periods:** Class # 11871, Section #LAB1, Tuesday, Periods 2 – 4, 8:30 a.m. – 11:30 a.m.  
Class # 21937, Section #LAB2, Wednesday, Periods 5 – 7, 11:45 a.m. – 2:45 p.m.  
Class # 21938, Section # LAB3, Thursday, Periods 2 – 4. 8:30 a.m. – 11:30 a.m.

**Location:** B17 Rhines

**Academic Term:** Fall 2025

## ***Instructor:***

Dr. Donald Wall

[Donald.wall@ufl.edu](mailto:Donald.wall@ufl.edu)

Phone: 352-273-2662

Office location: UFTR

Office Hours: Wednesdays

8:00 – 9:00 a.m.

UFTR facility

## ***Teaching Assistant:***

- Madeleine Forbes
- Email: [mforbes1@ufl.edu](mailto:mforbes1@ufl.edu)

## ***Course Description***

Laboratory experiments related to the physics and electronics of radiation detection and instrumentation systems for application to nuclear energy, radiological sciences, radiation protection, medical physics and imaging, and industrial safety and control systems.

## ***Course Pre-Requisites / Co-Requisites***

Prerequisite: ENU 4605

## ***Course Objectives***

The course objectives include comprehension and proficiency in the following topics:

- applications of interactions of radiation with matter
- radiation detection
- interpretation of radiation detector output
- developing written and oral communication skills

The course objectives will be addressed by means of:

- textbook study
- lecture material that will compliment and clarify the textbook material
- provide examples of applications, including some in-class problem solving exercises
- assigned problems, with emphasis on problems that have applications in the field

## ***Materials and Supply Fees***

\$31.00

**Relation to Program Outcomes (ABET):**

| Outcome                                                                                                                                                                                                                                       | Coverage* |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics                                                                                                  |           |
| 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors                   |           |
| 3. An ability to communicate effectively with a range of audiences                                                                                                                                                                            | high      |
| 4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |           |
| 5. An ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives                                                               |           |
| 6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions                                                                                                | high      |
| 7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies                                                                                                                                             |           |

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

**Required Textbooks and Software**

Laboratory procedures will be distributed as electronic files via Canvas.

**Recommended Materials**

- Radiation Detection and Measurement (2010)
- Glenn Knoll
- Wiley, Fourth Edition, ISBN: 978-0-470-13148-0

**Required Computer**

Recommended Computer Specifications: <https://it.ufl.edu/get-help/student-computer-recommendations/>  
HWCOE Computer Requirements: <https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/>

## Course Schedule

| Date                  | Subject                                                                     | Comments and Due Dates                                       |
|-----------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------|
| 1. Week of Aug 18     |                                                                             | No laboratory meeting this week.                             |
| 2. Week of Aug 25     | Introduction, safety, laboratory report writing                             |                                                              |
| 3. Week of Sept. 1    | <b>Exercise 1</b><br>Oscilloscopes, Nuclear instruments and NIM electronics | Quiz 1                                                       |
| 4. Week of Sept. 8    | Oscilloscopes, Nuclear instruments and NIM electronics                      | Oscilloscope/NIM electronics worksheet due 9/11              |
| 5. Week of Sept. 15   | <b>Exercise 2</b><br>Portable survey meters                                 | Quiz 2                                                       |
| 6. Week of Sept 22    | <b>Exercise 3</b><br>GM detectors                                           | Quiz 3<br>Portable survey meter report due 9/26              |
| 7. Week of Sept. 29   | GM detectors                                                                |                                                              |
| 8. Week of Oct 6      | <b>Exercise 4</b><br>Scintillation detectors                                | Quiz 4<br>GM detector report due 10/10                       |
| 9. Week of Oct 13     | Scintillation detectors                                                     |                                                              |
| 10. Week of Oct 20    | Makeup lab period                                                           | Scintillation report due 10/24                               |
| 11. Week of Oct 27    | <b>Exercise 5</b><br>HPGe                                                   | Quiz 5                                                       |
| 12. Week of Nov 3     | HPGe                                                                        |                                                              |
| 13. Week of Nov 10    | <b>Exercise 6</b><br>Neutron activation                                     | HPGe report due 11/14                                        |
| 14. Week of Nov 17    | Neutron activation                                                          |                                                              |
| <b>Week of Nov 24</b> | <b>Thanksgiving week, no class</b>                                          |                                                              |
| 15. Week of Dec. 1    | Makeup lab period and/or TBA                                                | NAA report due 12/2 (N.B. the NAA report is worth 40 points) |
| Final exam week:      | NO FINAL EXAM FOR THIS COURSE                                               |                                                              |

### **Important Dates**

There are no exams or final exam for this course. Please refer to the course schedule for assignment due dates.

### **Evaluation of Grades**

| Assignment            | Points per assignment | Total Points | Percentage of Final Grade |
|-----------------------|-----------------------|--------------|---------------------------|
| Quizzes (5)           | 10 each               | 50           | 25%                       |
| Short lab reports (5) | 20 each               | 100          | 50%                       |
| NAA lab report        | 50                    | 50           | 25%                       |
|                       |                       |              |                           |
|                       |                       | 200          | 100%                      |

### **Grading Policy**

| Percent     | Grade | Grade Points |
|-------------|-------|--------------|
| 93.4 - 100  | A     | 4.00         |
| 90.0 - 93.3 | A-    | 3.67         |
| 86.7 - 89.9 | B+    | 3.33         |
| 83.4 - 86.6 | B     | 3.00         |
| 80.0 - 83.3 | B-    | 2.67         |
| 76.7 - 79.9 | C+    | 2.33         |
| 73.4 - 76.6 | C     | 2.00         |
| 70.0 - 73.3 | C-    | 1.67         |
| 66.7 - 69.9 | D+    | 1.33         |
| 63.4 - 66.6 | D     | 1.00         |
| 60.0 - 63.3 | D-    | 0.67         |
| 0 - 59.9    | E     | 0.00         |

**Attendance Policy.** *Attendance is mandatory.* An individual student must be present during the class period in order to operate the instruments and gather data for the respective laboratory reports and quizzes.

**Makeup Exam Policy.** There are no exams for this course.

**Quizzes.** The quizzes will be at either the beginning or end of the class period according to the circumstances; the subject matter will be announced on the class period preceding the quiz date. Makeup quizzes will only be given under documented circumstances according to the University policy. Makeup quizzes will not be permitted if the instructor is not notified of the circumstances within 24 hours after the quiz has been given. Makeup quizzes will not be permitted after the quiz answer key has been posted.

**Assignments.** Assignments must be submitted via Canvas. Late assignments will not be accepted. Note carefully the time that the assignment is due—any assignment turned in after the due date and time gets flagged by Canvas as submitted late, and will not be accepted and will get a score of zero for the assignment. Also note that a late assignment, with a score of zero, has a significant impact on the course grade.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

**Legibility.** *Assignments or portions of assignments, (including quizzes) that are illegible will receive zero credit. As a guideline, difficult to read (or messy) = illegible.*

### ***Academic Policies & Resources***

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: <https://go.ufl.edu/syllabuspolices>. Instructor-specific guidelines for courses must accommodate these policies.

### ***Commitment to a Positive Learning Environment***

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCoe Human Resources, 352-392-0904, [student-support-hr@eng.ufl.edu](mailto:student-support-hr@eng.ufl.edu)
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, [pld@ufl.edu](mailto:pld@ufl.edu)