

Nuclear Radiation Detection and Instrumentation Laboratory
ENU 4612L

Class Periods:

- Section 12335, Tuesday, Periods 2 – 4, 8:30 a.m. -11:30 a.m.
- Section 26666, Wednesday, Periods 5 – 7, 11:45 a.m. – 2:45 p.m.
- Section 26667, Thursday, Periods 2 – 4. 8:30 a.m. – 11:30 a.m.

Location: B17 Rhines

Academic Term: Fall 2024

Instructor:

Dr. Donald Wall

Donald.wall@ufl.edu

Phone: 352-273-2662

Office location: UFTR

Office Hours: By appointment only

Teaching Assistants:

- Andrew Duckworth
- Andrew.duckworth@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 with a minimum grade of C and EEL 3003.

Corequisite: ENU 4612

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

\$47.60

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 and inclusive 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	

Required Textbooks and Software

- Radiation Shielding (2000)
- J. Kenneth Shultis, Richard E. Faw
- American Nuclear Society, ISBN: 0-89448-456-7
- 978-3-527-40606-7

Recommended Materials

- Nuclides and Isotopes, Chart of the Nuclides
Published by Knolls Atomic Power Laboratory
Publication date: 2010, 17th Edition
Available at www.nuclidechart.com

Note that the current price for a chart directly from Bechtel/KAPL is \$30, which is lower than the prices that are found at some other vendors. The book is the preferable format for classroom use. An earlier Edition is also acceptable.

Additional study materials will be posted on Canvas.

Course Schedule

Final exam: No final exam for this course

Date	Subject Reading	Comments and Due Dates
1. Week of Aug 19		No laboratory meeting this week.
2. Week of Aug 26	Introduction, safety, laboratory report writing	
3. Week of Sept. 2	Nuclear instruments and NIM electronics	Q1
4. Week of Sept. 9	Portable survey meters	Q2
5. Week of Sept. 16	Portable survey meters	
6. Week of Sept 23	GM detectors	Q3 Portable survey meter report due 9/27
7. Week of Sept. 30	GM detectors	
8. Week of Oct 7	Makeup lab period	GM detector report due 10/11
9. Week of Oct 14	Scintillation detectors	Q4
10. Week of Oct 21	Scintillation detectors	

11. Week of Oct 28	HPGe	Q5 Scintillation report due 11/01
12. Week of Nov 4	HPGe	
13. Week of Nov 11	Neutron activation	Q6 HPGe report due 11/15
14. Week of Nov 18	Neutron activation	
15. Week of Nov 25	Thanksgiving week, no class	
16. Week of Dec 2	Makeup lab period and/or TBA	NAA report due 12/4 (N.B. the NAA report is worth 40 points)
Final exam week:	NO FINAL EXAM FOR THIS COURSE	

There will be some units and discussions on professional ethics. The discussions on ethics are not specifically called out on the course schedule. The discussions on professional ethics will be included on different days, according to the relevance to the course material.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance Policy. *Attendance is mandatory.* Grades are based upon in-class activities, which cannot be completed outside class time.

Electronics. Use of cell phones or laptops for non-class related activities (checking email, etc.) is not permitted. The instructor reserves the right to instruct individuals to leave the classroom for violating this policy.

Makeup Exam Policy. There are no exams in 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.

Reports. The reports must be submitted via Canvas. Late reports will not be accepted. Note carefully the time that the report is due—any report turned in after the due date and time gets flagged by Canvas as submitted late, and will not be accepted.

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 and exams) that are illegible will receive zero credit. As a guideline, difficult to read (or messy) = illegible.

Evaluation of Grades

Assignment	Total Points
Reports (5)*	120
Quizzes (6)*	50
Total	170

* The first four reports are worth 20 points each. The NAA report is worth 40 points. Each quiz is worth 10 points. The lowest quiz grade will be dropped.

Grading Policy

Percent	Grade	Grade Points
94 - 100	A	4.00
90 - 93	A-	3.67
86 - 89	B+	3.33
83 - 85	B	3.00
80 - 83	B-	2.67
76 - 79	C+	2.33
73 - 75	C	2.00
70 - 72	C-	1.67
66 - 69	D+	1.33
63 - 65	D	1.00
60 - 62	D-	0.67
< 60	E	0.00

More information on UF grading policy may be found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive 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, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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

- Your academic advisor or Graduate Program Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling.
<https://www.career.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints:
<https://distance.ufl.edu/getting-help/>

<https://distance.ufl.edu/state-authorization-status/#student-complaint>.