

## **Principles of Nuclear Reactor Operations Laboratory**

ENU 5176L, Section 26496

**Class Periods:** Tuesday, Thursday, Period 7, 1:55 – 2:45 p.m.

**Location:** Room 3C, UFTR facility

**Academic Term:** Fall 2020

### ***Instructor:***

Dr. Donald Wall

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

352-273-2662

### ***Office Hours***

There will not be any in-person meetings as a part of office hours. I will be available for Zoom meetings during the following times:

Wednesday 1:00 p.m. – 4:00 p.m.

Thursday, 10:00 a.m. – 1:00 p.m.

Additional times are available by appointment.

I will post links to Zoom office hours on Canvas.

### ***Course Description***

1 credit hour.

Principles of reactor operations applied to startup, operation, and control of the training reactor to include performing reactor physics measurements and instrumentation and control calibrations.

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

There are no course pre-requisites or co-requisites.

### ***Course Objectives***

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

- Use of radiation monitoring instruments
- Irradiation of samples and data analysis
- Conduct of reactor pre-startup checkouts and reactor startup
- Measurement of reactor core characteristics

The course objectives will be addressed by means of

- Lecture delivery of course content
- Reading materials for each topic (reading materials will be provided as electronic files)
- Hands-on activities in the reactor facility

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

Not applicable.

### ***Required Textbooks and Software***

There are no required textbooks for this course. Study materials will be distributed in electronic format, usually as .pdf files or will be provided as links to material that is available online.

### **Recommended Materials**

- Nuclides and Isotopes, Chart of the Nuclides  
Published by Knolls Atomic Power Laboratory  
Publication date: 2010, 17<sup>th</sup> Edition  
Available at [www.nuclidechart.com](http://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.

Study materials will be distributed in electronic format, usually as .pdf files or will be provided as links to material that is available online.

Date	Subject	Comments
Week 1 (Sept 1 & 3)	Radiation surveys and survey instruments	
Week 2 (Sept 8 & 10)	High resolution gamma spectroscopy	Quiz 1, Sept. 8 Assignment 1 due Sept. 8
Week 3 (Sept 15 & 17)	High resolution gamma spectroscopy	Quiz 2, Sept. 15
Week 4 (Sept 22 & 24)	Material preparation for irradiation	Quiz 3, Sept. 22 Assignment 2 due Sept. 22
Week 5 (Sept 29 & Oct 1)	Neutron activation for short half-life materials	Quiz 4, Sept. 29
Week 6 (Oct 6 & 8)	Reactor flux determination by foil activation	Quiz 5, Oct. 6 Assignment 3 due Sept. 6
Week 7 (Oct 13 & 15)	Reactor flux determination by foil activation	Quiz 6, Oct. 13
Week 8 (Oct 20 & 22)	Fission product poisoning	Quiz 7, Oct. 20 Assignment 4 due Sept. 20
Week 9 (Oct 27 & 29)	Working in a hot cell	Quiz 8, Oct. 27
Week 10 (Nov 3 & 5)	Reactor startup and operation	Quiz 9, Nov. 3 Assignment 5 due Nov. 3
Week 11 (Nov 10 & 12)	Reactor startup and operation	Quiz 10, Nov. 10
Week 12 (Nov 17 & 19)	Control rod calibration	Quiz 11, Nov. 17 Assignment 6, due Nov. 17
Week 13 (Nov. 24) Nov 26, Thanksgiving Holiday, No class	Control rod calibration	
Week 14 (Dec 1 & 3)	Control rod calibration and determination of core excess reactivity	Quiz 12, Dec. 1 Assignment 7, due Dec. 1

Date	Subject	Comments
Week 15 (Dec 8 & 10)	Determination of core excess reactivity	Assignment 8 due Dec. 10
Week 16 Dec. 17	Final Exam Dec. 17. 3:00 – 5:00 p.m.	

***Note: Due to scheduling conflicts with reactor operations, it may be necessary to change the order or due date of some activities, or substitute alternate activities.***

### ***Online Course Recording***

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

### ***F2F Course Policy in Response to COVID-19***

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms (Click here for guidance from the CDC on symptoms of coronavirus), please use the UF Health screening system and follow the instructions on whether you are able to attend class. Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. Find more information in the university attendance policies.

### ***Attendance Policy, Class Expectations, and Make-Up Policy***

This course is primarily a laboratory-type course. There will be some lecture content that will precede the hands-on activities. Lectures may be delivered online—students should reasonably expect that some course interactions, such as lectures will be conducted online.

This is a laboratory-type course. Attendance for hands-on work is mandatory.

Assignments must be submitted via Canvas. Late assignments will not be accepted.

The two lowest quiz scores will be dropped. Missed quizzes cannot be made up except under compelling circumstances and only when an absence is excused. Refer to the University policy on excused absences.

Excused absences must be in compliance with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation.

### ***Evaluation of Grades***

Course activity	Points per activity	Total	Percent of total
Quizzes (12)*	10	100	32 %
Assignments (8)	25	200	54 %
Final Exam	50	50	14 %
	Total →	350	100%

\*Two lowest quiz scores will be dropped

### ***Grading Policy***

Percent	Grade	Grade Points
94 - 100	A	4.00
90.0 - 93.9	A-	3.67
87.0 - 89.9	B+	3.33
84.0 - 86.9	B	3.00
80.0 - 83.9	B-	2.67
77.0 - 79.9	C+	2.33
74.0 - 76.9	C	2.00
70.0 - 73.9	C-	1.67
67.0 - 69.9	D+	1.33
64.0 - 66.9	D	1.00
60.0 - 63.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

### ***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.ua.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.ua.ufl.edu/public-results/>.

### ***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 Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. 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 broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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:** <http://www.counseling.ufl.edu/cwc>, 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](mailto:title-ix@ufl.edu), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto: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](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://care.dso.ufl.edu>.

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.