

ENU 4605: Radiation Sources and Interactions (4 Cr) - Fall 2017

INSTRUCTOR	Dr. Leigh Winfrey 170 Rhines Hall winfrey@mse.ufl.edu 352.273.0297
LECTURES	Mondays & Wednesdays, Period 2, 8:30 am - 9:20 am, MAE-B 234 Mondays & Wednesdays, Period 3, 9:35 am - 10:25 am, MAE-B 234
OFFICE HOURS	Tuesdays 1:00pm - 3:00pm, or by appointment.
PREREQUISITE	None.
CO-REQUISITE	ENU 4001 or equivalent.
REQUIRED TEXT	<i>Atoms, Radiation, and Radiation Protection, Third Ed.</i> , J.E. Turner, Wiley, 2007
CATALOGUE DESCRIPTION	Interaction of ionizing radiation with matter; cross sections and radiation fields with emphasis on photons, heavy charged particles, and electrons.
COURSE PURPOSE	Following successful completion of this course, the student will have developed an integrated understanding of the interactions of radiation with matter with emphasis on the radiation of fission and fusion reactors.
COURSE GOALS	Broadly, the first goal of ENU 4605 is to provide students with a solid fundamental understanding of neutral and charged particles, their behavior, the sources that produce them, and how they interact with each other and with different phases of matter. In addition, and no less importantly, the second goal of ENU 4605 is to provide students an introduction to engineering problem solving, specifically how to begin solving problems that one might encounter in daily practice as an engineer, as well as in a text book. Finally, and again quite importantly, the third goal of ENU 4605 is to give students practice in the use of the particular math, science, and engineering problem solving tools that are particularly relevant to nuclear engineers.
COURSE OUTCOMES	ABET Outcomes Specifically Supported by ENU4605 Include: (a) Graduates will have an ability to apply knowledge of mathematics, science, and engineering. (c) Graduates will have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. (l) Graduates will have an ability apply advanced mathematics, science, and engineering science, including atomic and nuclear physics, and the transport and interaction of radiation with matter, to nuclear and radiological systems and processes. (n) Graduates will have an ability to work professionally in one or more of the areas of: nuclear power; nuclear instrumentation and measurements; nuclear materials; and radiation sources, shielding, and protection.
COURSE COMMUNICATION	Communication from the instructor will come in class, via email and through the course Canvas site, found at https://lss.at.ufl.edu/ .

ATTENDANCE POLICY Though attendance is not graded students are highly encouraged to attend regularly as class will include group exercises, discussions, and ad-hoc problem solving which may not be captured in the as-posted lecture notes.

CANCELLATION POLICY Barring emergencies, the instructor will give students prior notice of cancelled classes and office hours. Should an emergency occur, the instructor will notify the class as soon as possible. Office hours that are cancelled in advance will be covered or rescheduled. Notifications of class or office hour cancellation may come via Canvas, email, or written postings in the class room or instructor's office.

GRADING SCALE At a minimum, a 10 point grading scale will be used for this course. Grades will be rounded up to the next higher number grade if their decimal is 0.45 or higher.

As	Ranges	Bs	Ranges	Cs	Ranges	Ds	Ranges	E	Range
A	95 - 100	B+	87 - 92	C+	77 - 79	D+	67 - 69	E	0 - 60
A-	90 - 94	B	83 - 86	C	73 - 76	D	63 - 66		
		B-	80 - 82	C-	70 - 72	D-	60 - 62		

Detailed information on University of Florida Grading Policies may be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

GRADING CATEGORIES 15% Homework Assignments
10% In-Class Problem Solving
25% Midterm Exam 1, *approximately 4 October 2017, 8:30 - 10:25am, MAE-B 234*
25% Midterm Exam 2, *approximately 8 November 2017, 8:30 - 10:25am, MAE-B 234*
25% Final Exam, *13 December 2017, 7:30 - 9:30am, MAE-B 234*

GRADING POLICIES **Partial Credit:**
Partial credit will be given on all assignments and exams unless otherwise specified.

Grading Errors:

Errors in assigning points, taking off points, or in figuring a student's grade for an assignment or exam will be corrected promptly when they occur. Students are encouraged to bring these errors to the instructor's attention quickly, but corrections will be made at any time.

Re-grading:

At students' requests the instructor may choose to re-grade a homework assignment or exam even if no errors were made in figuring grades. To receive a re-grade, students must return the assignment or exam to the instructor within one week of the work's return and include a brief *written explanation* of the requested re-evaluation, a short email is sufficient. Please keep the following guidelines in mind:

- The instructor *will not* discuss re-grading in the classroom. This is to protect students' privacy when discussing grades and to prevent either lingering in the classroom as a courtesy to the instructor and class following or to prevent beginning class late as a courtesy to ENU4605 colleagues.
- The instructor *will not* discuss re-grading in any hallway. This is to protect students' privacy when discussing grades and as a courtesy to the instructor.
- The instructor *may* choose to re-grade the *entire* assignment or exam.
- The instructor *will* return the assignment or exam to the student with in one week of the requested re-evaluation.

GENERAL
PROBLEM
SOLVING
REMINDERS

These reminders are good practice and apply to a variety of problems: assignment, exam, notebook, lab book, log book, or experiment record. They are also intended as a concise guide to learning through problem solving, provide the student with useful information when studying, and serve as suggestions for maximizing partial credit.

- Include relevant equations, assumptions, initial conditions, boundary conditions, or other information relevant to the problem.
- Problems may require the use of reference materials in addition to notes and the text book, i.e. the periodic table, cross section tables, physical constants, schematics, engineering specifications, ...etc..., to achieve an acceptable solution.
- Most problems don't have "right answer," rather they more often have an "acceptable solution" in practice. Problems may require estimation, assumption, or "engineering judgement" to achieve a acceptable solution. Note that this will not always be explicitly stated.
- Significant figures matter. Excess digits do not confer precision, accuracy, or confidence on a numerical value. Conversely, in some calculations variation in the 10000th place of a number will yield not only a wrong, but physically impossible value.
- Check units, then check them again. Sure about those units? Never report a value without a unit. If a number doesn't have one, note it as such.
- Always "reality check" an answer. This is how one develops "engineering judgement" and tracks down mistakes.

HOMEWORK

Homework assignments will be posted on Canvas and announced in class. Students are responsible for any assigned reading material from the text even if not covered in class. Please keep the following guidelines in mind:

Homework Submission:

- Students *may* complete homework in groups. Each student must *independently* write up and submit his or her own work. *Copying is not permitted.* Group submissions are not permitted.
- Due dates and times will be posted with assignments on Canvas. Late homework will *always* be accepted up to 48 hours after the due date and *may* be accepted later. Late homework *may* receive a 10% grade penalty.
- Late homework turn-in in the event of illness or travel can be arranged on discussion with the instructor; this should be arranged prior to the due date when possible.

Homework Format:

- Work on pages torn from stapled, glue-bound, or spiral notebooks *will not* be accepted. No exceptions.
- All work must be turned in on 8.5in x 11in paper. No exceptions.
- Use only the front of each page. No exceptions.
- Engineering paper is suggested but not required. Paper may be blank, quadrille, or standard or college rule. Paper may be any "standard" color, i.e. white, off white, cream, yellow, yellowish, engineering greenish, or similar. Please refrain from using pastel, bright, or neon papers as this makes grading difficult.
- For written work #2 (or darker) pencil or ink in blue or black is preferred. Other dark inks are acceptable. Please do not use red ink. Please refrain from using, pastel, bright, metallic, or neon inks as this makes grading difficult.
- It is the student's responsibility to ensure homework can be read, understood, and graded. The instructor may return work that is *unreadable or insufficiently explained* for correction and penalize it as late.
- Generally, each new significant solution step, mathematical manipulation, numerical substitution, etc. should begin a new line.
- Boxing or underlining final answers is very highly suggested.

IN-CLASS PROBLEM SOLVING	<p>Through the semester, a significant number of class periods will be devoted to students solving problems and presenting them in class. Generally, students will be divided into small groups of approximately 3 students and given time to work collaboratively on solving a problem relevant to recent lectures. Each group will then step through the problem with the class as a whole as the “instructor(s)”. Occasionally students will be assigned a small problem to prepare before class to present on their own. These activities will be explained in greater detail at the time of assignment. Grading will largely be on attempt to complete, not accuracy.</p>
EXAMS	<p>Three exams will be given through out the semester: two midterm and one final exam. Approximate dates for the two mid-term exams are given, but may vary slightly depending on course pace and material coverage. Exact dates will be announced at least one week in advance.</p> <p>Exams will be closed book, closed note, individual work. Students will be provided paper. Students will be allowed to bring writing implements of their own choosing and a calculator. Students are highly suggested to get an scientific non-graphing calculator. Students will be required to clear graphing calculator memories before exams. Laptops, tablets, e-readers, phones, fitness bands, smart watches, and earphones must be inaccessible during exams.</p> <p>Makeup exams will be given under limited circumstances. Excused absences consist of university sanctioned absences, or other justified absences (generally religious observances, conference travel, or interviews) verified and approved by the instructor. If the absence or conflict is known in advance, the student must notify the instructor prior to the exam, and <i>rescheduling must take place prior</i> to be counted as an excused absence. Makeup exams without advanced notice of the absence will generally only be given in emergency situations and are at the discretion of the instructor.</p>
HONOR CODE	<p>The University of Florida Policy on Academic Misconduct will be observed and strictly enforced. Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code found at http://www.dso.ufl.edu/students.php.</p>
SPECIAL REQUIREMENTS	<p>Any student with special needs, disabilities, or requiring accommodations should schedule a meeting with the instructor to discuss his or her needs as soon as possible.</p> <p>Further, from the University of Florida Policy on Accommodating Students With Disabilities, students requesting accommodation for disabilities must first register with the Dean of Students Office found at http://www.dso.ufl.edu/drc/. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.</p>
CHANGES IN THE SYLLABUS	<p>This syllabus represents current plans and objectives. As the semester progresses, those plans may need to change to enhance the class. Such changes will be communicated clearly, are not unusual and should be expected.</p>