

ENU 4630: Fundamental Aspects of Radiation Shielding (3 Cr) - Fall 2015

INSTRUCTOR	Dr. Christopher Hughes Office:TBD crhughes@ufl.edu Phone: TBD
LECTURE	Mondays, 10:40 am - 12:35 pm, NSC 225 Wednesdays, 10:40 am - 11:30 am, NSC 225
OFFICE HOURS	TBD. Update will be sent by email.
PREREQUISITE	ENU 4605 - Radiation Interactions and Sources, with a minimum grade of C
REQUIRED TEXT	<i>Radiation Shielding</i> , Kenneth Shultis & Richard Faw, American Nuclear Society, 2002 ISBN: 0-89448-456-7
COURSE DESCRIPTION	Basic principles of radiation shielding, and the study of radiation sources and shielding design for radiation facilities.
COURSE PURPOSE	Calculate the radiation shielding requirements for commonly encountered sources of photon, neutron, and charged particle radiations and integrate these calculations with materials and optimization parameters to design complete shielded structures for radiation facilities. By developing a complete understanding of the physical phenomena that occur as radiation is attenuated in materials, theoretical and numerical calculation techniques will be developed to predict the resulting radiation fields. MCNP will be the primary numerical technique utilized. Students will develop the ability to estimate uncertainties associated with the various approximation and empirical techniques for determining realistic radiation shielding requirements.
PROGRAM EDUCATIONAL OBJECTIVES SUPPORTED BY COURSE	<ol style="list-style-type: none">1. Graduates will have successful careers in Nuclear Engineering or related disciplines.2. Graduates will pursue advanced degrees or continuing education.
PROFESSIONAL COMPONENTS SUPPORTED BY COURSE	<ol style="list-style-type: none">1. Provide students with the ability to apply advanced mathematics, computational skills, science and engineering science, including atomic and nuclear physics, to identify, formulate, analyze, and solve nuclear and radiological engineering problems.4. Provide students with the skills needed to communicate effectively, work collaboratively, and understand their professional and ethical responsibilities and the impact of engineering solutions in a societal and economic context so they can pursue successful, productive careers in nuclear and radiological engineering.
PROGRAM OUTCOMES SUPPORTED BY COURSE	<ul style="list-style-type: none">• (a) An ability to apply knowledge of mathematics, science and engineering for problem solving in engineering• (d) An ability to function effectively on multi-disciplinary skills teams• (e) An ability to identify, formulate and solve engineering problems• (f) An understanding of professional, ethical and regulatory responsibility in engineering practice

- (g) An ability to communicate effectively, using both oral and written presentations, in engineering practice
- (n) An ability to work professionally in one or more of the areas of: nuclear power reactors, nuclear

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 *Skip at your peril.* Attendance is not considered in the grade. However, some materials in the course will not be covered in the textbook or in the notes provided online – only in class. Some example problems and complex figures (hard to digitize, easy to make on chalkboard) fall into this category. Students are responsible for these materials. If a student arrives late or leaves early, he/she is expected to do so with minimum level of disruption to the class in progress. There is no tolerance for mobile phones or other electronic disruptions. Such disruptions will lead to the student being told to leave the room for the duration of the class period, *including during examination periods*. The same principle applies to office hours or appointments – if you stop by my office and your phone rings, you will be told to leave the room for the duration of that day’s office hours (or your appointment considered over).
I reserve the right to take attendance to prioritize e-mail assistance.

MAKE-UP WORK POLICIES Absences and late-work excuses can be grouped into the categories of *professional*, *medical*, and *personal*.
Professional: Reasonable extensions for job/internship interviews, technical conferences, or other professional/career development reasons should be requested. Requests are typically granted, at my discretion, unless they would grant a student or group of students an unfair advantage over their peers, cause significant disruption to the course or grading schedule, or violate some UF policy.
Medical: Extensions will also be granted for (your own) medical reasons – please do not come to class if you are ill. Per UF policy, in the case of medical absences that are frequent or suspiciously-timed (*e.g.*; you are repeatedly, suddenly ill at deadlines), I may request a signed note from a physician or similar professional practitioner.
Personal: In addition, UF policies require accommodation for several non-academic, non-medical reasons. *Extensions for these personal issues are strictly limited to those mandated by the letter of UF policies.* Pursuant to HWCOE policy, the following statement is required: Excused absences are consistent with university policies in the undergraduate catalog <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx> and require appropriate documentation.
As used in the above-referenced list of approved absence reasons, the word “family” shall be taken to mean your parents, grandparents, great-grandparents (etc.); children, grandchildren (etc.); siblings; aunts/uncles; nieces/nephews; your spouse and the spouse of any of the above; and half- or step- “versions” of the above categories. More distant relatives (cousins, etc.), partners (excluding spouses), and pets are not included. Minor illnesses (guideline: anything meriting home care only or care at a walk-in clinic, as opposed to an ER) of family members, including minor children, do not count as serious family emergencies, nor do events such as birthdays, anniversaries, weddings, etc.
The list of UF-approved personal reasons changes from time to time. If you have a question regarding your personal issue and if it qualifies under one of the excused absence policies, contact me in advance.
Note that any make-up work or extension will not reduce the work expected of you, but merely rearrange the timing. In the case where your approved make-up work adversely affects a group project, I may modify the assignment and/or groups for those concerned to minimize the disruption of one student’s issues on other group members.

CANCELLATION
POLICY

Barring emergencies, the instructor will give students prior notice of cancelled classes and office hours. Should an emergency situation occur, the instructor will attempt to notify the class as soon as possible.

GRADING
POLICY

The final grades will be assigned based on:

- A: $\geq 90\%$
- B: 80-89.99%
- C: 70-79.99%
- E: $< 70\%$

I reserve the right to grant higher grades at the end of the course at my sole discretion, including the use of A-, B+, B-, and C+. Under no circumstances will grades of C- or any flavor of D be used. Regardless, the following statement is required by COE policy: "A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:

<http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>"

Assignments and exams will be weighted as follows:

30% Homework Assignments

30% Quizzes

20% Project One

20% Project Two

Partial credit will be given on all assignments, projects, and quizzes unless otherwise specified. Errors in calculating a student's grade for an assignment, project, or quiz will be corrected promptly if they occur.

All appeals of grades, including those from clerical/grade-calculation errors, must be made within 1 week of return. (This may be modified for specific assignments near the end of the term. I will announce this via e-mail as needed.)

Grade appeals must be provided in the following format:

- Include your entire assignment *unmodified*.
- Attach (paper clip preferred) a written summary of which problem(s) or part(s) you believe were graded inaccurately. Be as specific as possible.
- Turn in your appeal to me at class time or during office hours.
- I will review your grade appeal, contact you via your ufl.edu e-mail address, and return the assignment in class. Fairly simple appeals provided to me during office hours may be decided upon while you wait, at my discretion.

Appeals will be considered for clerical errors, addition errors, and inconsistent scoring. Grade appeals will not be entertained if you simply do not like that (for example) Part 1 was worth only 2 points with Part 2 worth 5.

On very rare occasions, some denied appeals may be deemed "frivolous", if I believe the student is not acting in a good faith belief that more points are deserved. Following two frivolous appeals, your grade appeal privilege through this method will be *revoked*. Further appeals must be done through the petitions process, which requires formal paperwork and department/program level involvement.

HOMEWORK

The student is responsible for all material in the reading assignments from the text even if not covered in class. Homework assignments will be posted on Canvas and announced

in class. Students may conduct homework and study sessions in groups. However, each person must *independently* write up and submit his or her own work. Copying is not permitted. It is the student's responsibility to ensure homework is legible; at the discretion of the instructor *unreadable homework may receive no credit*.

All homework is due at the beginning of class; homework received after the start of class will be considered late. Late homework will be accepted up to 5:00 PM on the day after the due date. Late homework may be turned in to the instructor in person. *Late homework may receive a 10% grade penalty*.

PROJECTS

Students will be formed into groups of approximately 4 people for each project. The first project will involve characterization of a radiation source and shielding. Groups will make short presentations and turn in a technical report. The date of the presentations will be determined once the project has been assigned, approximately the 3rd week of class. The second project will involve human-radiation dosing or the environmental release of radioactive material. Again, 4 person groups will be assigned, a technical report will be required, and presentations will be made during the final exam period, Friday, December 16, 2016, 7:30 am - 9:30 am.

COLLABORATION

Projects are to be done in groups. I will assign the groups. A peer review system is in place to assure equitable workload. In the event the workload is not equitable, I reserve the right to adjust individual grades to accurately reflect contributions to the work. The ground rules for collaboration should be decided by each group through compromise and consensus. However, regardless of the preferences of the group as a whole, each student retains the individual right to privacy and to maintain good mental and physical health. To this end, no student shall be compelled:

- To join a real-name social networking site or modify their existing use of such a site, or
- To accept a 24/7 or other onerous on-call policy.

That is: each member holds a unilateral veto on using Facebook (or some such) for your group's work or for being contacted at all hours of the day and night.

Inter-personal issues within your group stemming from deciding group rules must be brought to me *promptly* for arbitration. This arbitration will focus on the guidelines above and in forming an equitable compromise (essentially, equal marginal/new inconvenience) among group members and not on determining whose activities outside this course (including personal pursuits, situations, and choices) are more meritorious.

No collaboration is permitted between teams on projects. The allowed level of collaboration on homework may vary and is specified on the assignment.

QUIZZES

Announced quizzes will be given approximately every other week. All quizzes will be closed book and closed notes with the calculator policy specified at the time of the announcement. Quizzes and their topics will be announced in class and on Canvas at least one class meeting in advance, but students may generally assume that quizzes cover the most recent home work and previous week's lectures.

Makeup quizzes will be given under limited circumstances. Excused absences consist of university-sanctioned absences, or other justified absences, verified and approved by the instructor. If the absence or conflict is known in advance, the student must notify the instructor prior to the quiz, and *rescheduling must take place prior* to be counted as an excused absence.

HONOR CODE

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>.

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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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 me.

ACCOMMODATION FOR STUDENTS WITH DISABILITIES Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to me when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

HEALTH AND WELLNESS RESOURCES

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
- 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 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 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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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.

COURSE EVALUATIONS	<p>The University of Florida expects students to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at https://evaluations.ufl.edu</p> <p>Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results</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>