

**Location:** WEB L122

**Time:** MW 3:00 PM – 4:20 PM

**Instructor:** Prof. Luther McDonald IV

**Office Hrs:** Prof. McDonald: M/W Noon – 1:30 and by appointment – Office is in MEB 3276 (inside the MEB 3280 Suite)

**Prerequisites:** Basic math skills with an understanding of undergraduate calculus. Interest in radiation, radioactivity, and the social implications of energy production and use. Willingness to become better informed and to work hard.

**Textbook:** Fundamentals of Nuclear Science and Engineering, Second Edition.

<https://www.amazon.com/Fundamentals-Nuclear-Science-Engineering-Second/dp/1420051350>

### **Course Objectives**

Coursework will cover major topics in introducing fundamental concepts in nuclear engineering including the physics and chemistry of radioactive decay, radiation detection and health physics. Details on alpha, beta, gamma decay, and fission are discussed. This course will focus on the nuclear fuel cycle covering mining, enrichment, fuel production, nuclear power, and nuclear waste disposal. Additional topics will be introduced relevant to current events including nuclear weapons and nuclear medicine.

### **Course Outcomes**

Following completion of this course, students are expected to be able to understand and apply the following:

- a) concepts of radioactivity
- b) lifecycle of the nuclear fuel cycle
- c) nuclear power production
- d) containment of nuclear accidents
- e) production and mitigation of nuclear weapons

### **Diagnostic Examinations**

Two examinations will be given throughout the course. These examinations are to test the students' retention of the fundamental knowledge.

Midterm Exam 1: 10/2

Final Exam: 12/12 (3:30 – 5:30 PM)

### **Homework**

There will be five homework assignments during the course of the semester. Practice is critical to developing the fundamentals of nuclear engineering. Hence, homework is a very large portion of this class! All homework is required to be VERY neatly hand written or typed. It must be posted in the Canvas Homework Folder by Midnight on the required date. Late assignments will have a half-life of 12 hours.

HW 1: 9/9

HW 2: 9/25

HW 3: 10/28

HW 4: 11/20

### **Critical Report**

Students will prepare a critical report on one of the four topics below. These reports will be due on 12/2.

1. Cleanup of the Hanford Site
2. Lessons learned from Chernobyl
3. Nuclear Weapons in North Korea
4. Targeted Alpha Therapy in Nuclear Medicine

This report must be 2.5 – 3 pages, singled spaced, with 1” margins on all sides and 12 pt. Times New Roman. A minimum of three peer reviewed journal articles must be referenced. Reports submitted not in the proper format will not be graded.

### **Grading**

Homework – 48% (12% each)

Diagnostic examinations – 40% (20% for each)

Critical Report – 12%

Final grades will be assigned on the following basis:

100.0% to 93.00% = A	92.99% to 90.00% = A-	
89.99% to 87.00% = B+	86.99% to 83.00% = B	82.99% to 80.00% = B-
79.99% to 77.00% = C+	76.99% to 73.00% = C	72.99% to 70.00% = C-
69.99% to 60.00% = D	59.99% to 0.00% = F	

### **“Schtuff” Happens Policy**

The “Stuff Happens” Policy: Because we realize that stuff happens (i.e. unforeseeable events that interfere with your ability to complete an assignment on time), we will allow you to submit one assignment up to one week late without penalty and with no questions asked. If your assignment is submitted late, it must be handed in directly to Prof. McDonald (NOT put in my mailbox, slid under my office door, or emailed to me). Submissions directly to me will be accepted both inside and outside of the class period but will conform to the “Schtuff Happens” rules.

<b>The “Schtuff Happens” rules</b>
Only ONE assignment this semester
Up to ONE week late
NO penalty
NO questions asked
Handed DIRECTLY to Dr. McDonald

### **Americans with Disabilities Act (ADA) Statement**

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

### **Addressing Sexual Misconduct**

Title IX makes it clear that violence and harassment based on sex and gender (which Includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

### **Names/Pronouns**

Class rosters are provided to the instructor with the student’s legal name as well as “Preferred first name” (if previously entered by you in the Student Profile section of your CIS account, which managed can be managed at any time). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels

best for you in class or on assignments. Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun are respected. If you need any assistance or support, please reach out to the LGBT Resource Center. [https://lgbt.utah.edu/campus/faculty\\_resources.php](https://lgbt.utah.edu/campus/faculty_resources.php)

### **Campus Safety**

The University of Utah values the safety of all campus community members. To report suspicious activity, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu).

### **Wellness Statement**

Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at [www.wellness.utah.edu](http://www.wellness.utah.edu) or 801-581-7776.

### **Diversity / Inclusivity Statement**

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

### **Veterans Center**

If you are a **student veteran**, we want you to know that the U of Utah has a Veterans Support Center on campus. They are located in Room 161 in the Olpin Union Building. Hours: M-F 8-5pm. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: <http://veteranscenter.utah.edu/>. Please also let me know if you need any additional support in this class for any reason.

### **Learners of English as an Additional/Second Language**

If you are an English language learner, please be aware of several resources on campus that will support you with your language development and writing. These resources include: the Department of Linguistics ESL Program (<http://linguistics.utah.edu/esl-program/>); the Writing Center (<http://writingcenter.utah.edu/>); the Writing Program (<http://writing-program.utah.edu/>); the English Language Institute (<http://continue.utah.edu/eli/>). Please let me know if there is any additional support you would like to discuss for this class.

### **Cheating Policy**

Cheating of any kind will not be tolerated. Any assignment or exam that is handed in must be your own work! However, talking with one another to understand the material better is strongly encouraged. Recognizing the distinction between cheating and cooperation is very important.

- If you copy someone else's solution, you are cheating. If you let someone else copy your solution, you are cheating. We will not distinguish between the person who copied a solution and the person whose solution was copied. Both people will be treated as cheaters.
- If someone dictates a solution to you, you are cheating. Everything you hand in must be in your own words, and based on your own understanding of the solution.

- If someone helps you understand the problem during a high-level discussion, you are not cheating. We strongly encourage students to help one another understand the material presented in class, in the book, and general issues relevant to the assignments.
- When taking an exam, you must work independently. Any collaboration during an exam will be considered cheating.
- Any student who is caught cheating will be given an E in the course and referred to the University Student Behavior Committee. Many students think they can get away with cheating and will not be caught. But it is much easier to spot cheaters than you might think! Please don't take that chance. If you're having trouble understanding the material, please let us know and we will be more than happy to help.

If you have any questions about what constitutes cheating, please ask.

[The University of Utah Student Code](#) (Sections III and V in particular) has a detailed description on the University policy on cheating.

### **Drop/Withdraw**

Please note the difference between the terms “drop” and “withdraw”. Drop implies that the student will not be held financially responsible and a “W” will not be listed on the transcript. Withdraw means that a “W” will appear on the student’s transcript and tuition will be charged. Please see the College of Engineering guidelines for dropping and withdrawing from a course this Fall. <https://www.coe.utah.edu/semester-guidelines>

### **Repeating Course Policy**

When a College of Engineering class is taken more than once, only the grade for the second attempt is counted. Grades of W, I, or V on the student’s record count as having taken the class. Departments enforce these guidelines for other courses as well (e.g., math, physics biology, chemistry). Attempts of courses taken at transfer institutions count as one attempt. This means a student may take the course only one time at the University of Utah. Courses taken at the University of Utah may not be taken a second time at another institution. If a second attempt is needed, it must be at the University of Utah. Please work with your department advisor to determine the value of repeating courses. Students should note that anyone who takes a required class twice and does not have a satisfactory grade the second time may not be able to graduate. It is the responsibility of the student to work with the department of their major to determine how this policy applies in extenuating circumstances.

### **Course Schedule**

Topic 1: Radioactivity, Energetics of Radioactivity: Chapters 4 – 5

Topic 2: Nuclear Fuel Cycle (Pre-Nuclear Power): Lecture Notes

Topic 3: Introduction to Neutrons: Chapter 6

Topic 4: Neutron Interactions and Detection: Chapters 7 – 8

Topic 5: Introduction to Nuclear Power: Chapters 10 – 11

Topic 6: Nuclear Fuel Cycle (Post-Nuclear Power): Lecture Notes

# COLLEGE OF ENGINEERING GUIDELINES

<https://www.coe.utah.edu/semester-guidelines>

Fall Semester 2019

## Appeals Procedures

*See the Code of Student Rights and Responsibilities, located in the Class Schedule or on the UofU Web site for more details*

### Appeals of Grades and other Academic Actions

If a student believes that an academic action is arbitrary or capricious he/she should discuss the action with the involved faculty member and attempt to resolve. If unable to resolve, the student may appeal the action in accordance with the following procedure:

1. Appeal to Department Chair (in writing) within 40 business days; chair must notify student of a decision within 15 days. If faculty member or student disagrees with decision, then,
2. Appeal to Academic Appeals Committee (see <https://www.coe.utah.edu/students/academic-affairs/academics/> for members of committee). See II Section D, Code of Student Rights and Responsibilities for details on Academic Appeals Committee hearings.

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## Adding Classes-Full Term

**Please read carefully:** All classes must be added within **10 academic days** of the beginning of the semester (**deadline: Friday, August 30, 2019**). Late adds will be allowed August 31-September 9, requiring only the instructor's signature. Any request to add a class after September 9th will require signatures from the instructor, department, and Dean, and need to be accompanied by a petition letter to the Dean's office.

**A \$50 FEE WILL BE ASSESSED BY THE REGISTRAR'S OFFICE FOR ADDING CLASSES AFTER September 9th.**\*\*\*

**\*\*\*\*Before you elect to take a class CR/NC you should check with your Advisor. Core classes used to compute your Engineering GPA need letter grades.**

## Withdrawal Procedures

*See the Class Schedule or web for more details* \*\* Please note the difference between the terms "drop" and "withdraw".

Drop implies that the student will not be held financially responsible and a "W" will not be listed on the transcript. Withdraw means that a "W" will appear on the student's transcript and tuition will be charged. \*\*

### Drop Period For Full Term Classes– No Penalty

Students may DROP any class without penalty or permission during the FIRST TEN academic days of the term (Friday, August 30, 2019).

### Withdrawal from Full Term Length Classes

Students may WITHDRAW from classes without petition **Friday, October 18, 2019**. Beginning August 31st until October 18th, a "W" will appear on the transcript AND **tuition will be charged**. Refer to Class Schedule, Tuition and Fees for tuition information.

### Drop/Withdrawal from Session I & Session II

See the web page for details:

<https://registrar.utah.edu/academic-calendars/fall2019.php>

Withdrawals for term length classes after October 18th will only be granted due to compelling, nonacademic emergencies. A petition and supporting documentation must be submitted to the Dean's Office, 1602 Warnock Engineering Building. Petitions must be received before the last day of classes (**December 5, 2019**).

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