Instructor: Dr. Irvin Osborne-Lee, Professor of Chemical Engineering  
Office: Virtual, Phone: (936) 261-9406, Mobile (281) 217-1169  
E-mail: oslee@pvamu.edu

Class Meeting Time: TR 10:10 – 11:30 AM, Location: Zoom (see link in eCourses)
Office Hours: MWF 9:00 – 11:50 AM (Send request for Zoom Meeting via Email)
Prerequisites: Junior or senior standing in an engineering or science major

Recommended Textbook: Power Point slides, class handouts from various sources, assigned readings, relevant papers. Open source textbooks.


Course Description: (3-0) Credit 3 semester hours. The course will review key topics in nuclear and radiochemistry, explore the chemical and physical characterization methods for actinide-bearing materials, and examine case studies to uncover crucial facts about discovered or interdicted nuclear material, such as identity, origin, ownership, intent (who, what, when, where, why and how), with a goal of understanding what it takes to secure modern society.

Course Goals: In completing this course students will demonstrate understanding, ability to apply, and review/write papers and designs involving:  
• The chart of nuclides (and be able to use it)  
• Different modes of radioactive decay  
• Components of the nucleus and how it influences nuclear properties  
• How fission is induced and the resulting products  
• Radiation detection and mass spectroscopy, and be able to determine isotope concentration or ratios
• The fundamental components and chemistry in the nuclear fuel cycle
• The chemistry of key radio-nuclides in applications important to nuclear forensics
• The application of analytical methods in characterizing materials
• Case studies in nuclear forensics.

Access to Learning Resources

CHEG Department Computer Lab
  Wilson 202
PVAMU Library:
  phone: (936) 261-1500;
  web: http://www.tamu.edu/pvamu/library/
University Bookstore:
  phone: (936) 261-1990;
  web: https://www.bkstr.com/Home/10001-10734-1?demoKey=d

Course Objectives Assessed

The course is designed to incorporate continuous assessment of students using homework, quizzes, projects and oral reports to evaluate competence in outcomes as outlined below:

a. Ability to apply knowledge of science, mathematics and engineering

h. The broad education necessary to understand the impact of engineering solutions in a global and societal context

j. A knowledge of contemporary issues

College of Engineering Textbook Policy

Students MUST acquire the textbook if it is listed as required on the course syllabus for this course. The textbook must be acquired by the 10th class day. Students are not allowed to share textbooks with students who are currently registered in the same class. Failure to acquire (or show proof of purchase) the required textbook by the 10th class day will result in the student being administratively dropped from the course. The University will assess financial obligations for the course to the student as with any other dropped class according to the fee schedule as well as your financial aid may be affected.

Students who are not financially able to purchase a required textbook for an engineering course prior to the 10th class day may apply to the College of Engineering Textbook Fund for a textbook voucher. The voucher can only be used at the Campus Bookstore. This voucher is a loan and must be paid back to the College of Engineering prior to the start of pre-registration for the coming semester. If the loan is not repaid, a hold will be placed on your account. Additional information and application materials can be obtained from the Assistant Dean’s Office (SR Collins Rm. 349) and obtained online at the College of Engineering website under student resources.

This policy is applies to students who have declared a major (Engineering, Computer Science, and/or Technology) in the Roy G. Perry College of Engineering while taking courses in that college.
Note that the textbook for this course is recommended but not required. Key readings and study materials will be provided by the instructor or assigned for the student to research.

University Rules and Procedures

Disability statement (See Student Handbook):
Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator.

Academic misconduct (See Student Handbook):
You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

Forms of academic dishonesty:
1. Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.
2. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.
3. Fabrication: use of invented information or falsified research.
4. Plagiarism: unacknowledged quotation and/or paraphrase of someone else’s words, ideas, or data as one’s own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one’s own work also constitutes plagiarism.

Nonacademic misconduct (See Student Handbook)
The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor’s ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

Sexual misconduct (See Student Handbook):
Sexual harassment of students and employers at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.

Attendance Policy:
Prairie View A&M University requires regular class attendance. Excessive absences will result in lowered grades. Excessive absenteeism, whether excused or unexcused, may result in a student’s course grade being reduced or in assignment of a grade of “F”. Absences are accumulated beginning with the first day of class.

Student Academic Appeals Process
Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have
adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the Undergraduate Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint.

GRADING POLICY:

The overall grade will be based on the set of course assignments, including exercises, quizzes, exams, projects, and other activities, as shown in the table below. There may be major assignments such as exams or projects at midterm and during the final exam period. Exercises and quizzes will occur on a daily to weekly basis. There will be at multiple reports, based on a project assignments. The grade will be composed as shown below.

### Typical Grade Composition

<table>
<thead>
<tr>
<th>Grade Element</th>
<th>Weight</th>
<th>Actual1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion/Forum Activities</td>
<td>10%</td>
<td></td>
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<tr>
<td>Quizzes and Exercises</td>
<td>20%</td>
<td></td>
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<tr>
<td>Video Presentations (YouTube style)</td>
<td>30%</td>
<td></td>
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<tr>
<td>Project Reports (oral and/or written)</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Overall Grade</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Office Hour Participation2</td>
<td>+10%</td>
<td></td>
</tr>
<tr>
<td>Other Extra Credit3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 The Actual column may be used to record your grade elements and your overall grade (calculated as a weighted sum of the elements).

2 The regular office hours held provide an interactive mode of discussion of concepts, tips on assignment completion, and an opportunity to have questions answered. Extra credit points are earned in each active visit not to exceed the max shown.

3 Extra credit assignments may be applicable to this course and would consist of extra project work available to all. Discuss with instructor.

Letter grades will be assigned based on the numeric value of your adjusted grade (above) using a scale similar to the one below:

- A 90-100%
- B 80-89%
- C 70-79%
- D 60-69%
- F 00-59%

NOTE ON SCHOLASTIC DISHONESTY:

Please note that scholastic dishonesty will not be tolerated. Cheating or other such behaviors will result in a grade of zero (0) being assigned. All assignments are to be completed and turned in individually, unless otherwise specified by the instructor.

Conduct:

Students will conduct themselves in a manner that is respectful to his/her fellow classmates and the instructor at all times.
## Detailed Syllabus and Course Organization*

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture# and Topic with reference</th>
<th>Assignments</th>
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</thead>
<tbody>
<tr>
<td>Week 1:</td>
<td>Review of syllabus; course overview (table of contents); 1 Nuclear Science Fundamentals Review - Nuclear Structure and Decay</td>
<td>As posted to eCourses</td>
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<tr>
<td>Week 2:</td>
<td>2 Nuclear Science Fundamentals Review - Decay Modes and Radiation Emissions</td>
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<td>Week 3:</td>
<td>3 Nuclear Fission/Nuclear Power 4 Nuclear Threats</td>
<td></td>
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<tr>
<td>Week 4:</td>
<td>5 Nuclear Fission/Nuclear Explosive Devices 6 Nuclear Threats</td>
<td></td>
</tr>
<tr>
<td>Week 5: E-Week</td>
<td>Topic delayed due to inclement weather</td>
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<tr>
<td>Week 6:</td>
<td>Topic delayed due to inclement weather</td>
<td></td>
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<tr>
<td>Week 7:</td>
<td>7 Nuclear Fuel Cycle - Materials Production/Separation</td>
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<tr>
<td>Week 8: Midterms</td>
<td>8 Radiation Detection and Mass Spectroscopy</td>
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<td>Week 9:</td>
<td>9 Key Nuclides in Nuclear Forensics and Their Chemistry</td>
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<td>Week 10:</td>
<td>11 Methods in Forensic Analysis - Field and Laboratory analyses</td>
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<tr>
<td>Week 11:</td>
<td>13 Nuclear Materials Analyses: Chemical - Discussion</td>
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<td>Week 12:</td>
<td>14 Nuclear Materials Fingerprinting &amp; Source Attribution</td>
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<td>Week 13:</td>
<td>15 Case Study – Discussion</td>
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<td>Week 14:</td>
<td>16 Case Study – Student Project Work</td>
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<tr>
<td>Week 15:</td>
<td>27 Case Study – Student Presentations</td>
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<tr>
<td>Week 16:</td>
<td>29 Last day of class (course review) 30 Final Project</td>
<td></td>
</tr>
<tr>
<td>Added Work for Missed Classes</td>
<td>Field trips. May be virtual due to pandemic. Case study review, games, and exercises, either face-to-face with masking and social distancing or virtual.</td>
<td>4 lecture sessions</td>
</tr>
</tbody>
</table>

*Note: Instructor may modify/change the course syllabus as needed. Students will be provided with a revised syllabus as modifications are made. Assignments for graduate students are different than for undergraduates in that they include synthesis and review (as per Bloom’s Taxonomy).