Introduction to Nuclear Reactor Materials
EGN 6937  Section 06C0
Class Periods: M W F, 6, and 12:50-1:40PM
Location: MAEB 229
Academic Term: Spring 2017

Instructor:
Yong Yang
yongyang@ufl.edu
352-846-3791
Office Hours: Walk-in or appointment by email

Teaching Assistants:
Please contact through the Canvas website
N/A.

Course Description
Introduction to the materials used in nuclear energy systems and their response to the reactor environment. The majority of materials related issues encountered in the nuclear power plants are discussed in this course.

Course Pre-Requisites / Co-Requisites
None.

Course Objectives
To provide the students with a comprehensive knowledge on the types of materials used in nuclear reactors, their response to the reactor environments and most of the materials problems encountered in the operation of nuclear power reactors for energy production.

Materials and Supply Fees
None.

Required Textbooks and Software
No required textbook, and the course notes will be provided through Canvas.

Recommended Materials
Fundamentals of Radiation Materials Science, Gary Was
Fundamental aspects of nuclear reactor fuel elements, Donald R. Olander
Nuclear Reactor Materials and Applications by B. Ma

Course Schedule

Overview:
• 1. Course Introduction
• 2. Materials in Nuclear Reactor

Basis of Materials:
• 3. Crystal structures
• 4. Point defects in solids
• 5. Diffusion
• 6. Dislocation and grain boundary

Radiation damage:
• 7. Collision theory, Cross sections, Energy loss
• 8. SRIM, Range, Damage
• 9. Ion, Neutron damage
• 10. Microstructural development

**Fuel:**
• 11. Chemistry, fabrication, failure
• 12. Fission products
• 13. Swelling

**Mechanical performance:**
• 14. Creep
• 15. Hardening
• 16. Toughness

**Corrosion:**
• 17. Thermodynamics
• 18. Kinetics
• 19 Corrosion in nuclear fuel

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

Proper behavior in class is required, eating, texting, chatting, or other activities that are not part of the class are not allowed. Students who do not comply with these requirements or who behave disorderly or disrespectfully may be asked to leave the classroom. Cell phones and other electronic devices must be completely silenced or turned off.

Attendance is required and will be monitored using sign up sheets, and your attendance records will be available on Canvas. Five or more unexcused absences will result in a deduction of 20 points from your final grade.

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.

**Evaluation of Grades**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Total Points</th>
<th>Percentage of Final Grade</th>
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<tbody>
<tr>
<td>Homework Sets (4)</td>
<td>100 each</td>
<td>40%</td>
</tr>
<tr>
<td>In Class Exam #1</td>
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<tr>
<td>In Class Exam #2</td>
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<td>In Class Exam #3</td>
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**Grading Policy**

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
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<tbody>
<tr>
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<tr>
<td>91 - 95</td>
<td>A-</td>
<td>3.67</td>
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<tr>
<td>86 - 90</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>85 - 81</td>
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<td>B-</td>
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<tr>
<td>75 - 71</td>
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<tr>
<td>70 - 66</td>
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<td>2.00</td>
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<tr>
<td>76 - 65</td>
<td>C-</td>
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</tr>
<tr>
<td>64 - 62</td>
<td>D+</td>
<td>1.33</td>
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<tr>
<td>61 - 59</td>
<td>D</td>
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<tr>
<td>58 - 56</td>
<td>D-</td>
<td>0.67</td>
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</tbody>
</table>
More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations
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 the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. 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/.

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://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 the instructor or TAs in this class.

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:
http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources:

Health and Wellness

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](https://lss.at.ufl.edu/help.shtml).

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. [https://www.crc.ufl.edu/](https://www.crc.ufl.edu/).

**Library Support**, [http://cms.uflib.ufl.edu/ask](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/](https://teachingcenter.ufl.edu/).

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. [https://writing.ufl.edu/writing-studio/](https://writing.ufl.edu/writing-studio/).

**Student Complaints Campus**: [https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf)