



## Course Information

- **Fall 2021 NUCL 32000, Introduction to Materials for Nuclear Applications**
- CRN: 24266
- Location/Time: Gris 134/ MWF 9:30-10:20 am
- 3 credit hours
- Course Brightspace page: <https://purdue.brightspace.com> (Fall 2021 NUCL 32000 - Merge)

## Instructor Contact Information

- Instructor: Wen Jiang (Ph.D student)
- Office Location: INOK suite H (Lafayette)
- Purdue email address: [jiang568@purdue.edu](mailto:jiang568@purdue.edu)
- Office hours: MW 11am-12pm via Webex (online) and by appointment (physical).  
\*Meeting access will be posted on Brightspace
- You can reach me via Brightspace instant message and Purdue email with questions. For emails please add “NUCL 320” on the subject line for the awareness.

## Course Description

This is an introductory course, designed to provide the fundamental concepts of materials for nuclear applications. The course includes topics of atomic and crystal structure, imperfections, phase and phase diagrams, diffusion, mechanical properties, failure, thermal properties, corrosion, irradiation-induced degradation, and microstructure characterization techniques. The course covers both theory (fundamentals) and practice (how these fundamentals are related to the nuclear engineering), and include examples and applications in the nuclear energy area.

## Attendance Policy

Attendance expected, but not mandated. Masks are required indoors. **People without masks will not be allowed to attend the class. Do not eat or drink in class.** Please stay home and stay secured when feeling sick. Report in time when involved in COVID-19 related situations.

## Learning Resources, Technology & Texts

- Required texts: ISBN: 978-1119278566 – W. Callister and D. Rethwisch, Materials Science and Engineering: An Introduction (10<sup>th</sup> edition)

It is recommended that you get the textbook. Different editions are almost identical just organized differently. If you have the other edition already, you do not need to purchase the latest edition. Homework that based on the textbook questions will be displayed with full context.

- Additional/optional readings: will be presented on Brightspace.
- You can access the course via Brightspace. It is strongly suggested that you explore and become familiar not only with the site navigation, but with content and resources available for this course. See the Help tab for resources.
- Software resources: Microsoft Word. Remember that [MS Office is free for all students](#). It is strongly suggested that you explore and become familiar with the functions (including how to insert Equation and Symbol) in Word, and complete the assignments using Word. It is recommended that you convert the Word to PDF when uploading to Brightspace.

## Assignments

Assignments	Due	Points
Homework assignments 9	1 week after posted, midnight	90
Exam 1	10/6 9:30am (tentative)	40
Exam 2	11/26 9:30am (tentative)	40
Team-based Project Paper (topics will be posted before 11/18)	12/18 11:59pm	30
		<b>Total: 200</b>

- It is recommended that you use MS Word to complete the assignments, and convert the Word to PDF when uploading to Brightspace.
- You have one week to complete the homework, and 30 days to complete the paper.
- The team-based project paper is completed by 3-4 students in a team.
- Rubrics to grade assignments will be posted on the Brightspace.
- Make-up exams can be given and late homework can be accepted in the following scenarios: (1) if prearranged, before the due date, with me; (2) if the result of a documented emergency; or (3) if documented illness. Late homework will be given 25% point deduction per day otherwise. Failure to attend exams/submit homework leads to 0 credit. Other excuses are not accepted.

Note: For homework questions, please send them via Purdue email or Brightspace message no later than 5pm Eastern Time on the due day. Please do not expect me responding in the last minute on the due day.

## Grading Scale

In this class grades reflect the sum of your achievement throughout the semester. You will accumulate points as described in the assignments portion above, with each assignment graded according to a rubric. At the end of the semester, final grades will be calculated by adding the total points earned and translating those numbers (out of 210) into the following letters (there will be no rounding).

- A+: 193 - 200
- A: 188 - 192
- A-: 180 - 187
- B+: 173 - 179
- B: 168 - 172
- B-: 160 - 167
- C+: 153 - 159
- C: 147 - 152
- C-: 140 - 146
- D+: 133- 139
- D: 127 - 132
- D-: 120 - 126
- F: 119 or below

## Course Schedule

Week	Topic & Readings	Assignments
Week 1 (8/23-8/27)	Introduction; Atomic structure and interatomic bonding (Callister Ch2)	
Week 2 (8/30-9/3)	The structure of crystalline solids (Ch3)	Homework1
Week 3 (9/6-9/10)	Imperfections in solids (Ch4)	HW2
Week 4 (9/13-9/17)	Diffusion (Ch5)	HW3
Week 5 (9/20-9/24)	Phase diagrams (Ch9)	HW4
Week 6 (9/27-10/1)	Phase transformations (Ch10)	HW5
Week 7 (10/4-10/8)	Review for Exam1	Exam1 10/6 (tentative)
Week 8 (10/11-10/15)	Mechanical properties of metals (Ch6)	HW6
Week 9 (10/18-10/22)	Failure (Ch8)	HW7
Week 10 (10/25-10/29)	Corrosion and degradation of materials (Ch17)	HW8
Week 11 (11/1-11/5)	Thermal properties (Ch19)	HW9
Week 12 (11/8-11/12)	Irradiation induced degradation (online content)	Readings only
Week 13 (11/15-11/19)	Microstructure characterization techniques (online content)	Readings only
Week 14 (11/22-11/26)	Review for exam2	Thanksgiving Break starts 11/24
Week 15 (11/29-12/3)	No class	Exam2 11/29 (tentative)
Week 16 (12/6-12/10)	No class	
Week 16 (12/13-12/17)	No class	Project Paper 12/18

\* Schedule and assignments subject to change. Any changes will be posted on Brightspace or sent by Purdue email.

- 8/ 23 – Classes Begin
- 8/ 30 – Last day to register without a late fee
- 9/ 3 – Last day to cancel a course assignment without it appearing on record
- 9/ 6 – Labor day (No Classes)

- 9/20 – Last day to withdraw a course with a grade of W
- 10/11-12 – October Break
- 11/22 – Face-to-Face Instruction Ends
- 11/24-27 – Thanksgiving Break
- 12/11 – Classes End
- 12/18 – Commencement
- 12/21 – Grades Due

## Academic Guidance in the Event a Student is Quarantined/Isolated

If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center, you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at [acmq@purdue.edu](mailto:acmq@purdue.edu) and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email or Brightspace. We will make arrangements based on your particular situation. The Office of the Dean of Students ([odos@purdue.edu](mailto:odos@purdue.edu)) is also available to support you should this situation occur.

## Attendance Policy during COVID-19

Students should stay home and contact the Protect Purdue Health Center (496-INFO) if they feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus. In the current context of COVID-19, in-person attendance will not be a factor in the final grades, but the student still needs to inform the instructor of any conflict that can be anticipated and will affect the submission of an assignment or the ability to take an exam. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency conflict, when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, through Brightspace, or by phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via [email](mailto:email) or phone at 765-494-1747. Our course Brightspace includes a link on Attendance and Grief Absence policies under the University Policies menu.

## Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing [integrity@purdue.edu](mailto:integrity@purdue.edu) or by calling 765-494-8778. While information may be submitted anonymously, the more information is

submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace table of contents, under University Policies.

## **Nondiscrimination Statement**

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. More details are available on our course Brightspace table of contents, under University Policies.

## **Accessibility**

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: [drc@purdue.edu](mailto:drc@purdue.edu) or by phone: 765-494-1247. More details are available on our course Brightspace under Accessibility Information.

## **Mental Health Statement**

**If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#).** Sign in and find information and tools at your fingertips, available to you at any time.

**If you need support and information about options and resources,** please contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

**If you find yourself struggling to find a healthy balance between academics, social life, stress, etc.** sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at [evans240@purdue.edu](mailto:evans240@purdue.edu).

**If you're struggling and need mental health services:** Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

## **Emergency Preparation**

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructor via email or phone. You are expected to read your @purdue.edu email on a frequent basis.