ASEN 1022 - Spring 2021

Materials Science for Aerospace Engineers

Instructors:

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Class Web Site: log on to https://canvas.colorado.edu

Homework Site: WileyPlus (In Canvas)

Discussion Board: In Canvas!

Class e-mail list: This is automatically done through Canvas.

Texts: W.D Callister, *Materials Science and Engineering an Introduction*, 10th edition. Pearson, MUST include WileyPlus access. Note that with WileyPlus you will get access to both the homework and the e-book. Purchase through CU bookstore or Wiley website.

Prerequisites: APPM 1350 or MATH 1300 (minimum grade C). Required co-requisite courses: COEN 1300 or ECEN 1310 or CSCI 1300 or CSCI 1310 or CSCI 1320 or ASEN 1320.

Course Objectives: Introduce the fundamental understanding of the relation between composition, structure, processing, and properties of materials. Topics include atomic bonding, perfect and imperfect crystal structures, thermal and mechanical behavior of materials, and failure mechanisms, and heat

treatment. This course will provide insight into the design and selection of materials for aerospace applications.

Major Course Topics:
1. Atomic bonding.
2. Perfect and imperfect crystalline structures.
3. Diffusion.
4. Phase diagrams.
5. Mechanical and thermal behavior.
6. Failure mechanisms.
7. Heat treatment.
8. Material processing techniques.
9. Design and selection of materials

Grading Guideline:

Group work:	Homework*	16% (WileyPlus)
Individual:	6 Quizzes	84% (14% each)
Total:		100%

- Group work only counts towards final grade if the total individual grade is C or better.
- Please verify all your scores and grades on Canvas within 2 weeks after they are posted; requests to change a score need to be made within this period. All regrade requests should be submitted to Canvas folder as outlined in 'Important Notes' below.
- We reserve the right to make minor changes to this distribution of weights based on variations in assignments.

Exam Times and Locations:

1. Quiz 1: 02/04, 8:00 to 8:30 AM MT
2. Quiz 2: 02/18, 8:00 to 8:30 AM MT
3. Quiz 3: 03/04, 8:00 to 8:30 AM MT
4. Quiz 4: 03/16, 8:00 to 8:30 AM MT
5. Quiz 5: 04/08, 8:00 to 8:30 AM MT
6. Quiz 6: 04/22, 8:00 to 8:30 AM MT
7. OPTIONAL Final Exam: Weds May 4th at 7:30 to 9 PM MT

Online Learning Protocol
The first two weeks of the semester will be virtual. The Zoom meeting environment is a professional one—this includes expectations for your conduct, attire, and environment. Here are some highlights:

1) Please use your preferred full name when you join the Zoom session. Do not use any usernames or "nicknames" that don't represent your real name.
2) Please mute yourself when you are not talking to avoid distracting the rest of the class.
3) If you feel comfortable turning your camera on during office hours and lab, you are encouraged to do so. However, students will not be required to show video of themselves during any part of the class. If you choose to have your camera turned off, we would appreciate you putting a picture of yourself as your Zoom profile picture to help us connect your face to your name!
4) You will be able to fully participate in the class without having a webcam. You will be able to ask questions during office hours and lab through voice (by using the "Raise Hand" feature in Zoom) or through chat.
5) This course is a professional space. If you are not in an office-like setting, we recommend that you use a virtual background if your computer allows. Please wear attire that you would wear to class if we were meeting in person.
6) Be engaged and responsive during the meeting. Don't be afraid to speak or use chat, especially if the meeting is small. Your feedback and engagement are essential to the communication that takes place in a meeting.

Lecture: The first two weeks of the semester will have virtual lectures. Zoom link as follows**:**
XXXX

Quiz Times and Policies
Instead of exams, students will take 6 quizzes every other Friday throughout the semester. Each quiz will consist of a few multiple-choice questions and 1 work-out problem. Quizzes will be given during the class period.

- Materials Structure, Diffusion, and Phase Diagram Quizzes
  - Quiz 1: XX
  - Quiz 2: XX
  - Quiz 3: XX
- Mechanics of Materials, Materials Failures Modes, and Materials Processing Quizzes
  - Quiz 4: XX
  - Quiz 5: XX
  - Quiz 6: XX

As students may use the final exam to replace up to 3 quizzes, no make-up quizzes will be granted.

Final Exam
The final exam is optional: students are not required to take the final exam and the final exam will not be counted towards your grade on its own. The final exam will be used to replace up to 3 quiz grades. The final exam will consist of 6 questions, each one covering material from a different quiz. You will choose up to 3 questions to answer. If your score on a given final exam question is higher than your score for the corresponding quiz, your quiz score will be replaced with your score on that final exam question. If your score on a given final exam question is lower than your score for that quiz, your quiz score will remain unchanged.

The final exam will take place during the university-scheduled final exam time, which is:
Optional Final Exam: Weds May 4th from 7:30 to 9 PM MT

Office Hours: Students can ask questions about concepts, example problems given in the lecture videos, and homework assignments during office hours. Students are strongly encouraged to participate in office hours, even if they don't have specific questions about the material or the homework. Online Canvas discussion boards may also be used for any questions at any time and will be moderated by the instructional team. The office hour schedule and zoom link will be released on Canvas the second week of class.

Evaluated Outcomes: The Department of Aerospace Engineering Sciences has adopted a policy of assigning grades according to evaluated outcomes (Ox) in each course. Each assignment designed and graded to assess some combination of several or a few of the following outcomes:

- **O1** Professional context and expectations (ethics, economics, etc.)
- **O2** Historical perspective and vision
- **O3** Multidisciplinary, system perspective
- **O4** Written, oral, graphical communication ability
- **O5** Knowledge of key scientific/engineering concepts
- **O6** Ability to define and conduct experiments, use instrumentation
- **O7** Ability to learn independently, find information
- **O8** Ability to work in teams
- **O9** Ability to design systems
- **O10** Ability to formulate and solve problems
- **O11** Ability to use and program computers

Important Notes:

1. **Emails to your instructor should only be in the case of a family, medical, or personal emergency, or if you are struggling in the course and need advice.** All questions regarding homework, quizzes, or course policies MUST go to the Canvas discussion board. This allows for the instructional team to quickly respond to questions, and allows you to see other student questions.
2. If you are having a family, medical, or personal emergency, or are struggling in the course, please do reach out to us via email. Note that emails will be responded to during business hours, i.e. Monday through Friday, 8:00 am – 5:00 pm.
3. Changes may be made to the weekly course schedule based on occurring events that require different dispositions. We will give sufficient advance notice through announcements in class and posting on Canvas. Changes to this syllabus and assignments-table may be announced at any time during class periods. We will post the current syllabus and assignments-table on Canvas. Both are dated in the footnote.
4. Canvas will be used to send out announcements, to provide comments to you daily on class activities, and to provide general information about course assignments.
5. Why have reading assignments, homework?

- Reading assignments are to be completed before the lecture/discussion. The lecture/discussions should help to clarify and supplement what you have read.
- Homework assignments are to allow you to PRACTICE the important applications of current material. Remember- you cannot learn to juggle by watching someone juggle, you must attempt it yourself. The same is true with engineering- homework enforces the mental processes that help you to become proficient in a subject. Before beginning any homework assignment, you should read the text and work the examples in the text. Homework, which is graded in the category "groupwork", may be discussed with the TAs/TFs.
- Quizzes allow us to assess your learning and determine if you will be prepared for the follow -on courses, industry positions, and graduate school.

6. Homework:
    - All homework questions must be submitted to the Canvas discussion forum under the appropriate homework assignment/question. **No homework questions should be emailed to the instructional team- all questions should be asked at office hours or posted to Canvas**. The instructional team will not respond to posts that are posted after 5 PM the day before the homework is due.
    - Collaboration is permitted on homework. However, we strongly recommend to first work on your own on the homework before comparing your results with your homework team members. You may discuss the means and methods for formulating and solving problems and even compare answers, but you are not free to copy someone's assignment. **Copying material from any resource (including solutions manuals) and submitting it as one's own is considered plagiarism and is an Honor Code violation. Remember, the less you think about the problems yourself, the less you actually learn, and the more difficult it will be to succeed on quizzes.**
    - You are encouraged to answer questions that other students pose to Canvas, but you may only discuss the means and methods for formulating and solving problems. You cannot compare answers on Canvas, and you may not post your exact work or computer code.
    - No late homework assignments will be accepted. You will have one week to complete a homework assignment. You will be allowed to drop the lowest homework score at the end of the semester.
    - All homework must be submitted through WileyPlus.
    - Homework solutions will be posted shortly after the submission deadline.

7. Quizzes:
    - Makeup quizzes will not be granted for any reason. The final exam will be used for replacing up to 3 quiz grades per the policy stated above.
    - Regrade requests must be submitted to the professors in writing within 2 weeks of the grade posting to Canvas. Submit a single pdf document to the 'regrade request' folder on canvas with: the quiz problem with your original work, your hand-written CORRECT solution to the

quiz problem in question, and a page stating the problem number, grading issue, and what you believe the correct grade should be.

8. Grading:
    - Minor adjustments may be made in the determination of final letter grades and with grade cut lines, but there is no "curving" in this course.

    - To receive a course grade of C or better (which is required to fulfill the prerequisite for ASEN 4018), students must receive a C or better in the individual coursework portion of the class. Stated differently, the students who receive an individual grade of C- or lower will not receive any group grades.

Classroom Behavior

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on classroom behavior and the Student Conduct & Conflict Resolution policies.

Requirements for COVID-19

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. Students who fail to adhere to these requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policy on classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the "Accommodation for Disabilities" statement on this syllabus.

CU Boulder currently requires masks in classrooms and laboratories regardless of vaccination status. This requirement is a precaution to supplement CU Boulder's COVID-19 vaccine requirement. Exemptions include individuals who cannot medically tolerate a face covering, as well as those who are hearing-impaired or otherwise disabled or who are communicating with someone who is hearing-impaired or otherwise disabled and where the ability to see the mouth is essential to communication. If you qualify for a mask-related accommodation, please follow the steps in the "Accommodation for Disabilities" statement on this syllabus. In addition, vaccinated instructional faculty who are engaged in an indoor instructional activity and are separated by at least 6 feet from the nearest person are exempt from wearing masks if they so choose.

If you feel ill and think you might have COVID-19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-

19, you should stay home and follow the further guidance of the Public Health Office (contacttracing@colorado.edu). If you are fully vaccinated and have been in close contact with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the Public Health Office (contacttracing@colorado.edu).

Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see Temporary Medical Conditions on the Disability Services website.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code academic integrity policy. Violations of the Honor Code may include, but are not limited to: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the Honor Code website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. The university will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or email cureport@colorado.edu. Information about university policies, reporting options, and the support resources can be found on the OIEC website.

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options. To learn more about reporting and support options for a variety of concerns, visit Don't Ignore It.

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance.
See the campus policy regarding religious observances for full details.
In this class, excused absences for labs on religious holidays need to be communicated to the instructor via email 2 weeks ahead of the expected absence. See the campus policy regarding religious observances for full details.