ENGR 0022: Material Structure and Properties
Course Syllabus - Spring 2022

SCUPI
Sichuan University - Pittsburgh Institute

Catalog Description

To introduce the basic principles underlying the behavior of materials. This course provides the scientific foundation for understanding of the relations among material properties, microstructure, and behavior of metals, polymers, ceramics and composites. Students will develop a vocabulary for the description of the empirical facts and theoretical ideas about the various levels of structure, from atoms, through defects in crystals, to larger scale morphology of practical engineering materials. 3 credit hours.

Schedule

Monday/Friday: 8:15-11:00am, February 21 thru June 24, 2022
Room 3-103 and/or online

Instructor

Dr. Charles Hua, charleshua@scu.edu.cn, 17760422493 (WeChat and Mobile)
Office hours: Monday/Tuesday: 2-5pm, or by appointment
Room 3-322B and/or online, WeChat group

When sending email to the instructor, include "ENGR0022" in the subject field of your message. Use your university email account (student_ID_number@stu.scu.edu.cn); mail from other accounts might be stopped by the SCU spam filter. Use your real name or ID in your WeChat message, too.

Teaching Assistants:

陈喆 Zhe Chen: 874298978@qq.com WeChatID: xhi828, 13389253129
赵纬祎 Florence Zhao: 2019141520076@stu.scu.edu.cn；18109603556

Textbook: W. D. Callister Jr. and D. G. Rethwisch, Materials Science and Engineering: An Introduction, 10th Edition, John Wiley, January 2018. ISBN: 978-1-119-40549-8.
Wiley_Materials Science and Engineering: An Introduction, 10th Edition_978-1-119-72177-2.pdf.
(Please note that homework is following 9th edition).

Reference Book: W. F. Smith and J. Hashemi, Foundations of Materials Science and Engineering, 6th Edition, McGraw-Hill Education, January 26, 2018. ISBN-10: 1259696553, ISBN-13: 978-1259696558.

Web Site: This course uses the Blackboard system at
Materials Structures and Properties-section 1 (scu.edu.cn)
And/or Section 2 (scu.edu.cn)

There you will find the course syllabus, contents, homework assignments, and other materials. Please check the class page frequently.

Class Format

Material Structure and Properties is taught using a combined lecture, reading, review and discussion.

It is imperative that you come to class prepared. This will generally involve preview textbook, lectures and tutorial videos. This is a 3-credit hour class, which means you should devote at least 6 hours of effort outside the scheduled class time every week.

Class participation counts 20% grade weight: basic 12 points for weekly attendance, plus 2 for each counted Q/A during the class (not during break or in office, not for exam questions), +2 for being a Q/A moderator, -2 for each unexcused absence, or missed sign in, or each time playing cellphone or video game during class.

Homework Assignments

Homework problems (following 9th edition textbook) will be assigned every two week or so and posted on Blackboard. These are to be turned in by the specified due time. You may work with other people on homework, but all writeups must be individual efforts.

All homework should be submitted electronically through the Blackboard system. Late homework will get zero credit.

Please adhere to these homework guidelines:

- Your assignment must be typed in Word and submitted electronically through Blackboard, with Filename format Name-ID-Hw#. Handwritten assignments (or snapshot of handwritten version) will not be accepted.
- Put your name, ID number (last four digits), and class section at the top of the first page.
- List the names of other people you've worked with on the assignment or report.

All of the homework scores will be used in your grade computation. Unless otherwise indicated, you can work with your fellow classmates in the class, but you must submit a distinct and independent write-up to receive credit.

If you are sick, or have a compelling emergency that prevents you from turning in the homework on time, inform TA.

If you believe an error has been made in the grading of an assignment, bring it to the attention of your TA within ONE WEEK of its return.

Grading:

Total 100 points are divided into five parts - homework, mid-term1, mid-term2, final, and class participation.

If you are retaking, or have 2+2/3+1 plan, TOEFL schedule, health issues or the like, please inform TA at your earliest convenience.

Office Hours

If you do not understand something and/or want to explore more, and talking to your classmates does not help, then you should be seeking help from the instructor or teaching assistant.

Office hours are times we have specifically set aside to be available to students. During office hours, you can come to our office; you don't need an appointment. We are also available at other times; please email to schedule a time.

Current office hours will be Monday/Tuesday: 2-5pm,
Room 3-322B and/or online, WeChat group

Academic Integrity:

Students in this course will be expected to comply with the SCUPI and/or University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators. To foster a high level of academic integrity, the University of Pittsburgh **MEMS Department has recently established a coordinated and uniform approach** to dealing with violations of academic regulations against cheating and plagiarism.

Disabilities:

If you have a disability or sickness that requires special testing accommodations or other classroom modifications, you need to notify the instructor, student counselor, and/or the Disability Resources and Services in a timely manner. You may be asked to provide documentation of your disability or sickness to determine the appropriateness of accommodations.

Copyright Notice

The course materials may be protected by copyright. China and/or United States copyright law, prohibiting unauthorized duplication or retransmission. See Library of Congress Copyright Office and the University Copyright Policy.

Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

Statement on Distractions during lecture and laboratory

To ensure a foremost safe but also productive and distraction free learning environment, cellphones, smartwatches, laptops, tablets and other electronic devices are in general not allowed in the lab. Videogames or messaging during class hour is not allowed and will have grade point deduction. There will be exceptions from that rule after explicit permission, for example if calculations are needed.

Approximate Schedule via Textbook

1. Atomic Structure and Interatomic Bonding in Solids
2. The Structure of Crystalline Solids and Noncrystalline Materials
3. Imperfections in Solids
4. Diffusion
5. Mechanical Properties of Metals
6. Dislocations and Strengthening Mechanisms in Metals
7. Failure, (Fatigue, and Creep)
8. Phase Diagrams
9. Phase Transformations
10. Applications and Processing of Metal Alloys
11. Structures and Properties of Ceramics, Applications and Processing of Ceramics
12. Polymer Structures
13. Composites
14. Corrosion and Degradation of Materials
15. Electrical Properties
16. Thermal, Magnetic and Optical Properties
17. Environmental, and Societal Issues in Materials Science and Engineering