

**Schedule:** TR 2:00–3:20pm; MEB 253

**Prerequisites:** Chemistry 102; Physics 212; Physics 214 (concurrent)

**Text:** *Fundamentals of Materials Science and Engineering*, William Callister and David Rethwisch, Third edition for UIUC MatSE (Wiley)

**Instructor:** Dallas Trinkle (dtrinkle; 4–6519; 308 MSEB).

**Hours:** M 1:30–3:30pm; appointments: MTW 5:00–6:00pm or by arrangement.

**Teaching Assistant:** Rannesh Lokesh (lokesh1).

**Hours:** T 5:00–6:00pm, W 7:00–8:00pm, MSEB 205A; or by appointment.

**Scope:** The course addresses the materials science and engineering of metals, ceramics, polymers, electronic materials, and composites. Topics include: atomic structure and bonding, imperfections, diffusion, mechanical properties, strengthening, failure, phase diagrams, and materials selection. This course is concerned with connecting material properties to material chemistry, structure, and processing, with the goal of controlling or coping with that behavior.

**Objectives:** Students will be able to explain how fundamental microscopic physical mechanisms produce macroscopic behavior of materials. This includes: for a given material class, identifying the bonding type, likely crystal structure, and expected mechanical response; using elastic and plastic deformation to predict loads for yielding, necking or fracture; identify common defects and affect on material properties; connect dislocations to plastic deformation in metals; identify phases and transformations in material processing, and types of microstructures; connect crack propagation to material failure; compute material indices for simple design problems to select optimal materials.

**Reference Texts:** see reference desk in Grainger

**Grading Policy:** 10%×(Quizzes, Homework) + 20%×(Exam 1, Exam 2, Exam 3, Exam 4)

A+ (100–98)	A (97–94)	A– (93–91)
B+ (90–88)	B (87–84)	B– (83–81)
C+ (80–78)	C (77–74)	C– (73–71)
D+ (70–68)	D (77–64)	D– (63–61)
	F (60–0)	

- Daily reading from Callister is assigned for each class on COMPASS.
- Quizzes cover assigned reading; on COMPASS Mon. and Wed. 9am–9pm. Average best 20 of 24.
- Homework is collected on Thursdays at the **beginning of class**; it is available on COMPASS the week before, and solutions will be posted there. Late homework will not be accepted, and receives a grade of zero; two grades of zero on homework will result in a failing grade for the class. Not all homework questions may be graded, but all are scored.
- Students work in groups and submit a single group homework—see below.
- Questions about homework should be through a TA first.
- Exam questions are based on lecture examples, homework, and text—with modifications.
- Each exam cover topics from reading and lectures.
- Only calculators allowed by NCEES [calculator policy](#) are used on exams (c.f. FE exam).
- You will need to bring a photo ID with you on exam day to receive an exam.
- Students caught cheating receive a failing grade for the class.

**Honor Code:** You are bound by the [University Honor Code](#) in this course. Any violation of the Honor Code will result in disciplinary action.

**Emergency dean:** In case of a medical or family emergency that will result in missing class assignments/quizzes/exams, please contact the [emergency dean](#) as well as the instructor as soon as possible.

### Homework Groups:

- You pick teams of three or four.
- *Team expectations:* First meeting of teams will require mutual agreement of team expectations—what rules and expectations each team member agrees to abide by in their dealings together as a team. **Define, sign, turn in.** Not to be graded.
- Designate a **coordinator**, **recorder** and **checker** for each assignment. Rotate these roles every assignment.
- Students who get fired from or quit a team *must* find a triplet willing to take them, otherwise they get *zero* for remaining assignments. If there are no triplets, then you are in a conundrum.
- See COMPASS information on “Team Policies” for full details.

**Calendar and Topics:** Any changes to schedule will be announced. The course is broken into four sections of six lectures each. There are two weekly homework assignments for each section, ending with one exam. Homework is due on the date listed.

_____ Tuesday _____	_____ Wednesday _____	_____ Thursday _____
Aug. 24 Ch. 1		Aug. 26 Ch. 2
Aug. 31 Ch. 3		Sep. 2 Ch. 3, HW1
Sep. 7 Ch. 4		Sep. 9 Ch. 4, HW2
Sep. 14 Ch. 5	Sep. 15 <b>Exam 1</b> (Ch. 1–4)	Sep. 16 Ch. 5
Sep. 21 Ch. 6		Sep. 23 Ch. 7, HW3
Sep. 28 Ch. 7		Sep. 30 Ch. 7, HW4
<i>_____ canceled class _____</i>	Oct. 6 <b>Exam 2</b> (Ch. 5–7)	<i>_____ canceled class _____</i>
Oct. 12 Ch. 8		Oct. 14 Ch. 8
Oct. 19 Ch. 9		Oct. 21 Ch. 9, HW5
Oct. 26 Ch. 10		Oct. 28 Ch. 10, HW6
Nov. 2 Ch. 11	Nov. 3 <b>Exam 3</b> (Ch. 8–10)	Nov. 4 Ch. 11
Nov. 9 Ch. 15		Nov. 11 Ch. 15, HW7
Nov. 16 Ch. 21		Nov. 18 Ch. 21, HW8
<i>_____ Thanksgiving break _____</i>		
Nov. 30 Ch. 12		Dec. 2 <b>Exam 4</b> (Ch. 11, 15, 21, 12)

**Examination times:** Exams 1–3 are at 7:00–8:30pm; Exam 4 is during class (2:00–3:20pm). Exams 1 and 3 are in 100 MSEB, Exam 2 is in 151 Loomis, and Exam 4 is in 151 Everitt.

**Expectations:** To succeed in this class, you will need to

- read the chapter *before* coming to class, and formulate questions.
- participate in the class.
- make sure you understand the homework problems and solutions.
- seek out help when you have trouble by
  - using the classroom while the question is fresh.
  - using instructor or TA office hours, or making an appointment, either individuals or groups.
  - emailing the instructor or TA.
  - asking each other.
  - reading the reference texts—they offer different angles on the material.

**Changes to syllabus:** may occur as deemed necessary by the instructor; they will be announced.