

Purdue University
School of Materials Engineering

MSE 600 *Materials Engineering Fundamentals*

Fall 2021

Lecture: Tuesday and Thursday

Lecturer: Prof. Rod W. Trice, ARMS 2227, rtrice@purdue.edu

TA: TBD

Trice Office Hours:

TA Name Office Hours: TBD and email for offsite students

Students taking the course on campus will be called “onsite” students; students taking the course online will be called “offsite” students. Lectures will be recorded and posted on Brightspace for onsite and offsite students. It is not necessary for onsite students to attend class; in fact, it may be preferred by the student (and the instructor) to watch the videos online without a physical presence in the classroom. Really, the only difference between the onsite and offsite students will be the examinations. Onsite students will be expected to take the exams at the same time, all beginning during the normal class time via a webex link that will be sent out by Prof. Trice (more instructions below). He will serve as your proctor. Offsite students, each with their own proctor, will be able to take the exam anytime during the day. All onsite students and offsite proctors will need access to a printer.

Onsite students have to fulfill all the duties required and set by Purdue, including wearing a mask and wearing it properly (nose and mouth covered). I will remind you gently, but am not in the business of policing students on this matter. I will cancel class if a student resists following Purdue protocols and the students will be responsible for the missed material.

If you are taking this class you are a graduate student. With that in mind, it is time to start learning for more than the grade; learn because it is fun to know things, because it helps your research, guides you in your job. This class in particular should help to build a solid materials foundation that other graduate courses will build on. But, learning is work and the course will require time.

Course Objectives and Overview for MSE 600:

Understand the fundamental basis for materials phenomena in terms of the hierarchy of structures (e.g., atomic, molecular, crystal, grain) and their relations to properties responses and processing. Develop a foundation for advanced studies in materials engineering and related fields.

Fundamental relationships between the internal structure, properties and processing in all classes of engineering materials. Comprehensive coverage spanning physical, chemical, thermal, mechanical, electrical, magnetic, and optical responses.

The course is intended for materials researchers from all backgrounds, as well as engineers working in product design, development and manufacturing who seek a deeper understanding of the full spectrum of engineering materials.

Class Topics (tentative)

1. Introduction, bonding and crystal structure
2. Non-crystalline and molecular structure
3. Mechanical properties(elastic)
4. Mechanical properties(plastic and time-dependent)
5. Fracture of materials
6. Diffusion
7. Phase equilibrium and phase diagrams
8. Kinetics and phase transformations
9. Metal alloys and processing
10. Processing of glasses and ceramics
11. Processing of polymers
12. Composites
13. Electrical properties
13. Thermal properties
14. Magnetic properties
15. Optical properties
16. Wood as a material

Website

Homework problems and solutions, and links to other resources such as your lecture videos, will be available on Brightspace. Your grades will also be posted there as well.

Required Textbook

Materials Science and Engineering: An Introduction, William D. Callister, Jr., **8th edition** is the textbook. The 7th, 9th and 10th editions are acceptable, but Homework comes from 8th ed (but homework is not graded). Additional readings will be provided when necessary. **Reading** the textbook is strongly recommended. This text is very clearly written and will supplement lectures.

Lectures will emphasize the most important points but you are also responsible for the details in the reading that time may not permit covering in lecture.

Lectures will be given from an iPad which allows Prof. Trice to annotate slides during lecture. Thus, I will make available the pdf of the lectures so that students can either print them off or annotate them using their preferred method (iPad, Surface Pro, etc.) The provided slides are only “sketches” of the lectures, and you will need to add your own notes to them during class – thus, hopefully, we will avoid “death by Power Point”.

Homework and Homework Solutions are available on Brightspace. While there are homework problems to do every week, there is *no homework graded*. Homework is from the 8th edition of the textbook.

Examination Dates and Further Instructions

Exam 1: Thursday, October 1st (exam will cover ~6 wks of material)
Exam 2: Thursday, November 12th (exam will cover ~6 wks of material)
Final Exam: **TBD/finals week**

All examinations are closed-book but you may use up to 1 sheet of HANDWRITTEN notes (8.5” x 11”, two sides). Besides this crib sheet, the only other things allowed for the exams are writing implements, eraser, straight edge (ruler), and a calculator. *You cannot use your phone as a calculator but please bring your phone to the exams to upload your exam to gradescope.*

Onsite Students: You will log in to purdue.webex.com/meet/rtrice at 11:50 am (10 minutes before the exam begins) and I will monitor all members of the onsite students for the exam. I will make the examination available to you at that time through Brightspace. It will be necessary to have a printer somewhere near you.

Offsite Students: You must take the exam on the set exam day, but you will work out the time with your proctor. S/he will print out the exam for you. S/he will monitor your time.

All students will upload their exams to Gradescope just after the exam. See further instructions below.

Make-up exams will be given only for the following verifiable reasons: serious illness, family emergencies, direct conflict with another scheduled exam (must inform instructor no later than two weeks prior), or official university absence.

Grading appeals will be considered up to 5 days after an exam is returned to you. Exam regrade requests will be handled through Gradescope (see below); provide a brief, logical explanation of the basis in your appeal. I do make mistakes grading and am happy to take a look.

Grading

Exam I	30%
Exam II	30%
Final Exam	40%

Every semester I receive multiple emails asking if there is a way to obtain extra credit in the class. There is not. Your course grade will come from the 3 exams.

THE BEST WAY TO DO WELL IN MY CLASS IS TO LISTEN TO ALL LECTURES, AND

WORK THE HOMEWORKS.

In case of emergency, e-mail Prof. Trice at rtrice@purdue.edu as soon as possible.

Gradescope Overview and Practice Quiz

All students (offsite and onsite) will be uploading their exams on gradescope.com to facilitate my efficiency at getting you feedback on your performance. Thus, you will not be submitting any “paper” copies to me this semester. Your registration information for the class has been linked from Brightspace to gradescope.com.

Practice Quiz Assignment: On the Brightspace site for this course there is a folder titled “Gradescope.” Open this folder, click on “Gradescope” and it should take you to the site. Use your Purdue login information to gain entry; you should see a tab labeled MSE 600. Find the “Practice Quiz”, download it, and take the quiz. There is no grade associated with this quiz; the goal is to get you used to using Gradescope before the first exam.

After taking this practice quiz, it will need to be turned into a pdf document. There are various ways to do this including using your phone camera, a printer with the capability to make a pdf, etc. In the Gradescope file folder on Brightspace are instructions (“Scanning your Gradescope Document Guide”) for turning your quiz into a pdf using your phone. The suggested app is Genius Scan, but any application should do. Please make sure your pdf is in the portrait orientation and record the pages in the *same sequence as your exam*, beginning with your cover sheet! At this point, you will want to email or otherwise make available the pdf file so that you can upload it to Gradescope. (I found that if you use Genius Scan that sending the pdf via gmail works well.)

Once you have an accessible pdf of your practice quiz, read the other file in the Gradescope folder on Brightspace; the title is “Uploading your Gradescope Document Guide”. Follow these instructions to post your quiz to the Gradescope site. At this point you are finished. I will look over the practice quizzes to make sure all has been performed properly.

You must complete the Practice Quiz assignment by Tuesday the second week of class! Doing this practice on Gradescope.com is essential before the actual exams begin. I will look over your submissions to make sure they are correct. I will let you know individually if there is a problem.

As a reminder, all students will upload all and exams this semester to the gradescope site; once you have done this, **offsite students must turn in your paper copy to your proctor**. *Bring your phone to every exam. If you have any technical difficulties, it is key that you DO NOT retain possession of your exam.*

Special Requirements for Offsite Students

1. Students who are taking the class offsite will be responsible for watching the class videos posted on Brightspace. *Students who are offsite will be required to take the exams on the day they are given – see the course schedule.*

2. Offsite students will be responsible for identifying a proctor and sending his/her name and email, relation to you, and email to me (rtrice@purdue.edu) by Tuesday the second week of class. The exam will be sent directly to each proctor on the day of the exam, and he/she will proctor you on the exam providing 75 min (exam) or 120 min (final exam). *He/she will be responsible for printing the exam, and monitoring your time, and overseeing your efforts to load the assignment on Gradescope.*

At the end of your allotted time the proctor will oversee you while you make a pdf of your work and post it to Gradescope.com. Once you have done this, **turn in your paper copy to your proctor.** *Bring your phone to every exam. If you have any technical difficulties, it is key that you DO NOT retain possession of your exam, but rather turn it in to me, or your proctor.*

If you need to change your proctor from the one you gave me, please send me an email identifying your old proctor, your new proctor and whether it is temporary or permanent change.

Proctor Instructions (I will send this to your proctors)

The goal of every class I teach is to provide an equitable environment for all students. In otherwords, I want every student to have the same opportunity to do well (or not do well) in my class. **In my absence, I am dependent upon you to proctor the student in a way that is fair to the participants in the entire class, regardless of their physical location in the world.**

Your job is to:

1. Receive, print, and distribute the exam to your student. Do not share the exam with the student until he/she is ready to begin.
2. Monitor the time they receive (75 mins for exams, or 120 mins for final exam). One handwritten help sheet is allowed for exams, and 3 help sheets is allowed for the Final Exam. *No exam is open book or open classnotes.*
3. Oversee their efforts to load the exam/helpsheet on Gradescope.com (this should take 2-3 minutes)
4. Keep the exam in your possession until you receive an email from me releasing it to the student.

Campus Emergency Policy

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. Any such changes will be posted to the course website. If you are unable to use Brightspace from home please let us know early in the semester so we can make other arrangements for your special needs.

Academic Dishonesty

Purdue University Regulations, Part 5, Section III-B-2-a describes the formal policies governing academic dishonesty. A guide providing specific examples, tips, and consequences is available from the Office of the Dean of Students at <http://www.purdue.edu/ODOS/osrr/integrity.htm>.

