

**Purdue University
School of Materials Engineering**

MSE 230 *Structure and Properties of Materials*

Fall 2017

Lecture: Mondays and Wednesdays at 9:30 (ARMS 1010) and 12:30 (ARMS 1010)

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

BoilerCasts: BoilerCasts of the 9:30 PM and 12:30 PM lectures will be available typically a few hours after class. All MSE 230 students should be able to access the MSE 230 BoilerCasts via our Blackboard site.

Trice Office Hours: to be determined

Recitations

R6	Thur. 10:30	ARMS 1021	Paul Mather, pmather@purdue.edu
R14	Thur. 12:30	ME 2004	Paul Mather, pmather@purdue.edu
R12	Thur. 3:30	ME 3006	Naotaka Ogura, nogura@purdue.edu
R5	Thur. 4:30	ME 1015	Naotaka Ogura, nogura@purdue.edu
R10	Fri. 8:30	ARMS 1021	Andrew Schlup, aschlup@purdue.edu
R11	Fri. 9:30	ARMS 1021	Congying Wang, wang3294@purdue.edu
R3	Fri. 10:30	ARMS 1021	Andrew Schlup, aschlup@purdue.edu
R8	Fri. 11:30	ARMS 1103	Congying Wang, wang3294@purdue.edu
R4	Fri. 12:30	KNOY B41	Saaketh Desai, desai61@purdue.edu
R13	Fri. 2:30	ARMS 1103	Saaketh Desai, desai61@purdue.edu

Textbook

Materials Science and Engineering: An Introduction, William D. Callister, Jr., 7th, 8th or 9th editions are acceptable. Homework comes from 8th ed.

Website

Homework problems and solutions and links to other resources will be available on Blackboard. Your grades will also be posted there as well.

Examination Dates

Exam 1:	Wednesday, Sept 27, 6:30 - 7:30, EE 129 and PHYSICS 112
Exam 2:	Wednesday, November 8, 6:30 – 7:30, EE 129 and PHYSICS 112
Final Exam:	TBD

Course Objectives for MSE 230 can be found at:

<https://engineering.purdue.edu/MSE/Academics/Courses/MSE230/index.html>

1. To provide an introduction to Materials Science and Engineering (MSE) as the study of structure-properties-processing relationships in engineering materials (metals, polymers, ceramics, and composites).

2. To develop the general and specific relationships between the different levels of internal structure (atomic, molecular, crystal, grain, etc.) and the basic properties (physical, mechanical, thermal, electrical, etc.) of engineering materials.
3. To show how structure, and thus properties, are controlled and manipulated in the basic processing operations.
4. To apply the structure-properties-processing approach to the specification of materials for engineering applications and develop appreciation for MSE as a tool in engineering design.

Procedures

Reading the textbook is strongly recommended. This text is very clearly written and will supplement lectures. The attached schedule indicates the required readings.

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. Feel free to ask short questions in lecture. Consult the schedule for required readings.

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”. *A bound copy of the notes will be available at CopyMat Services in the village, near Basil Thai, for about \$20.*

Recitations will consist of discussion led by the recitation instructor to review/supplement the reading and lecture, review of homework, and quizzes that will occur nearly every week. Questions about how your quiz is graded should be directed first to the TA. If the matter cannot be resolved between the two of you, then please see me.

Common Question: “I have a job interview this Friday during recitation. Can I take the quiz on the following Monday?” Probably yes, work out the details with your TA. Show them some evidence of the interview.

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

Expected format for quizzes and exams

1. Neat, legible, organized, and in sufficient detail to demonstrate that you understood and performed the calculations yourself. Draw a system schematic as appropriate. Put problems in sequential order! Correct answers that just appear will not be given any credit.
2. Check the dimensions in any calculation and also that your answer makes physical sense.
3. Use reasonable precision in reporting the numerical value of calculations (e.g., not all 10 places of your calculator display) and use units consistently (SI unless otherwise given).

PARTIAL CREDIT ON ANY QUIZ OR EXAM PROBLEMS IS DISCRETIONARY AND MAY NOT BE PROVIDED AT ALL OR PARTICULARLY IF THE RESULT DOES NOT MAKE PHYSICAL SENSE. IF YOU KNOW YOUR FINAL ANSWER IS RIDICULOUS INDICATE SO GIVING YOUR REASONING. UNDER THESE CIRCUMSTANCES PARTIAL CREDIT FOR CALCULATION ERRORS MAY BE GRANTED.

Quizzes (20 minute, closed-book) will cover basic concepts from the reading, lecture, recitation, and homework suggested for that week. Where needed, equations will be provided. There will be 11 quizzes this semester. Quizzes will be given at the end of recitation. One quiz grade will be dropped.

Participation in recitation will not be scored, per se, but will be used in deciding borderline cases in final grading.

Examinations

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.*

If space allows, we will sit in alternate seating during exams grouped by recitation. More details before the first exam.

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

Make-up exams or quizzes 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. Do not schedule travel without knowing the final exam schedule.

Grading appeals will be considered up to one week after an exam (or quiz) is returned to you. Make no additional marks on the paper. Return the entire exam or quiz along with a brief, logical explanation of the basis for your appeal written on a separate sheet of paper.

Grading

Exams (27.5% ea)	55%
Final Exam (comprehensive)	35%
Quizzes (best 10 scores)	10%

Final grades

The C/B division will be no higher than the median score. The B/A and D/C divisions will depend on class performance, but will be no higher than the 80th and 20th percentile, respectively. Borderline cases may be raised up (but not down) based on subjective appraisal of the student’s participation. If your average is below 40% you will have earned an F in this class.

Cheating

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>.

The MSE 230 teaching staff will diligently monitor academic dishonesty in quizzes and exams. Students found to engage in academic dishonesty are subject to sanctions. For a first offense, the student will receive a zero score for the quiz or exam. Depending on the severity of the offense, the case may be referred to the Office of the Dean of Students for further action. A second offense will result in a failing grade for MSE 230 and definite referral to the Office of the Dean of Students.

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 Blackboard from home please let us know early in the semester so we can make other arrangements for your special needs.

THE BEST WAY TO DO WELL IN MY CLASS IS TO ATTEND ALL LECTURES.

Week	Meeting	Date	Topics	Reading From Callister	Quiz or Exam Coverage
1	L1	Aug 21	Introduction	Chap 1	
	L2	Aug 23	Atom Attractions	Ch 2, (Ch 19 WebCT)	
	R1	Aug 24/25	Miller Indices Practice/Quiz 1		Hmwk #1
2	L3	Aug 28	How Atoms Self-Organize - Crystals	3.1-3.12 (no hcp)	
	L4	Aug 30	Grains and X-rays	3.13-3.17	
	R2	A 31/S 1	Quiz 2		Hmwk #2
3	H	Sep 4	Labor Day Holiday		
	L5	Sep 6	Deformation of Materials	Chap 6	
	R3	Sep 7/8	No Quiz this week		
4	L6	Sep 11	Why Materials Aren't as Strong as They...	4.5, 4.6, 7.1-7.13	
	L7	Sep 13	How to Strengthen a Metal	7.8 and paragraph before it	
	R4	Sep 14/15	Quiz 3		Hmwk #3/#4
5	L8	Sep 18	Materials with Cracks – Fracture Mechanics	Chap 8	
	L9	Sep 20	A Little Bit of Failure/Diffusion		
	R5	Sep 21/22	Quiz #4		Hmwk #5
6	L10	Sep 25	How Atoms Move: Diffusion	4.2, Chap 5	
	L11	Sep 27	Simple Phase Diagrams	4.3, 4.4, 9.1-9.10	
	Exam 1	Sept 27	(No Recitation) 6:30-7:30	Various Locations	HW 1-5
7	L12	Oct 2	More Complex Phase Diagrams	9.11-9.12	
	L13	Oct 4	Fe-Fe ₃ C Phase Diag./Non-Equilibrium Micro.	9.14, 9.18-9.20, Ch 10	
	R6	Oct 5/6	Review Exam/Quiz 5		Hmwk #6
8	H	Oct 9	October Break		Oct Break
	L14	Oct 11	There is More to Steel than Pearlite	10.5-10.9, 11.7-11.8	
	R7	Oct 12-13	No Quiz		Hmwk #7
9	L15	Oct 16	More Non-Equilibrium Microstructures	11.3, 11.9	
	L16	Oct 18	Specialty Metals – Stainless Steel, Cast Iron...	11.2	
	R8	Oct 19/20	Quiz 6		Hmwk #8
10	L17	Oct 23	Introduction to Ceramics	12.1-12.4, 12.7-12.11	
	L18	Oct 25	Processing Ceramics	13.1-13.9, 13.11	
	R9	Oct 26/27	Quiz 7		Hmwk #9
11	L19	Oct 30	Intro. to Polymers	(Not 14.8, 15.10)	
	L20	Nov 1	More Polymers	(Not 15.17-18)	
	R10	Nov 2/3	Quiz 8		Hmwk #10
12	L21	Nov 6	Still More Polymers	(Not 15.20-21, 15.23-24)	
	L22	Nov 8	Getting the Best of Both Materials: Composites	(Not 16.13-16.15)	
	Exam 2	Nov 8	(No Recitation) 6:30-7:30	Various Locations	HW 6-10
13	L23	Nov 13	Thermal Properties of Materials	Class Notes	
	L24	Nov 15	Electrical Properties of Materials	Chap 19 WebCT	
	R11	Nov 16/17	Review Exam/Quiz 9		Hmwk #11
14	L25	Nov 20	Band Structures of Materials	(Not 18.14, 18.18-18.23)	
	H	Nov 22	Thanksgiving Holiday		
	H	Nov 23/24	Thanksgiving Holiday		
15	L26	Nov 27	Semiconductors	(Not 18.14, 18.18-18.23)	
	L27	Nov 29	Semiconductors/TBD	(Not 18.14, 18.18-18.23)	
	R12	N30/D 1	Quiz 10		Hmwk #12
16	L28	Dec 4	Traditional Composites	(Not 18.14, 18.18-18.23)	
	L29	Dec 6	Evaluation/Review		
	R13	Dec 7/8	Quiz 11		Hmwk #13
17	Final	Dec XX	TBD	XXX	Comprehensive