

MSE 170 A and B Fall 2009

| <u>Instructor</u> | <u>E-mail Address</u> | <u>Office Location</u> | <u>Phone</u> |
|-------------------|--|------------------------|----------------|
| Marco Rolandi | rolandi@u.washington.edu | 302J Roberts | (206) 221-0309 |
| Office Hours | Fri 9:30- 11:30 am or by appointment if you have a class scheduling conflict | | |

send emails with "MSE 170" in the subject line- otherwise they might not be read!

Course Objectives:

This course is designed to provide an overview of the field of materials science and engineering. By the end of this course, you will be exposed to the main principles of MSE and you will be able to choose subsequent courses in the department to solidify the knowledge of what you are passionate about. At the end of each section, the name of specific upper level classes that cover the presented subject will be indicated.

Upon completion of this course, the student will be able to:

- Understand what dictates materials choice in specific everyday applications
- Classify different materials according to their properties and structures
- Understand how materials nano and micro-structure dictate the properties
- Understand how materials properties can be controlled through processing
- Understand the properties and structures of metals, polymers, ceramics, and composites.
- Describe the main characteristics of electronic materials

Lab TA's _____ office hours _____ location

Peter Kazarinoff (**Lead TA**) peterkaz@u.washington.edu Monday 1:30-2:30pm in Muller 168

Ashley Tracey atracey@u.washington.edu Thursday 2:30-3:30pm in Roberts 4th floor Lobby

Tianlong Wen halong@u.washington.edu Wednesday 11:00am-12:00pm in Roberts 319

Zach Stephen zrs420@u.washington.edu Tuesday 11:30-12:30pm in Roberts 319 (small conference room)

MS&E Engineering Technicians

Tuesday Kuykendall tuesday@u.washington.edu
Kevin Soderlund (ME) Basement of ME building

Lectures

| | | <u>LAB</u> |
|------------------------------|---------|-------------|
| Section A: 8:30- 9:20 AM MWF | MUE 153 | Mueller 168 |
| Section B: 12:30-1:20 AM MWF | MEB 238 | Mueller 168 |

TEXT: William D Callister, Jr., Materials Science and Engineering an Introduction, 7th Edition

Course information: <http://courses.washington.edu/mse170>

Course Expectation and Grading:

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|-----------------------------------|-----|
| Homework: | 15% |
| Midterm | 20% |
| Final | 38% |
| Labs | 25% |
| Participation in Discussion Board | 2% |

Homework: Homework is due at 5PM every Friday, stapled with your name, section, TA name, and student number on the first page; lacking any of this information or **any HW not done legibly** may result in a penalty to your grade. A lock box labeled "MSE170 Homework Drop Box" is provided on the 4th floor of Roberts Hall (directly behind Mueller Hall) to turn in homework. **NO LATE HOMEWORK WILL BE ACCEPTED.** Students will be allowed to drop their lowest homework grade at the end of the quarter. Graded homework will be returned to Mueller 168. Solutions will be posted on the website.

Labs: Safety first! Use this [Safety handout](#) guideline. You must have safety glasses or goggles during lab sessions, along with long pants and closed-toe shoes. You must attend the lab section for which you have enrolled unless other arrangements are made ahead of time. If you do not attend your lab section the first week, and do not notify your respective lab TA or the lead TA, you may be DROPPED from the class list. Prior to each lab, you will be expected to print out a copy of the lab handout from this web page, read the lab handout, answer designated pre-lab questions in your lab notebook and otherwise make a lab notebook entry as discussed below. Some of the labs will require a formal write-up, and these lab reports will be due at the beginning of your lab section the week following the completion of the lab experiment.

Late Lab reports: Late lab reports will be accepted for a partial credit under the following conditions: a maximum of 80% if you turn it in within 24 hours after the due date, and a maximum of 50% for turning in later than 24 hours but before one week (at the beginning of your following lab session), no points after that.

CLASS SCHEDULE (Subject to Change)

Last up date: Nov 23, 2009

| Week | # | Lecture Topic | Reading | Homework | Laboratory |
|--------------------|----------------|---|---|---|--|
| Week 1 Sep. 30 | 1 2 | <ul style="list-style-type: none"> • Introduction • Bonding in Solids | 1: 1-5 2: 1-8 | No homework due this week | NO LAB |
| Week 2 Oct 5 | 3 4 5 | <ul style="list-style-type: none"> • Crystal Structures • Ceramics • Crystal Directions & Planes | 3: 1-7 12: 1-4 3: 8-15 | 2: 14, 22 3: 5, 8, 13 Due Oct. 9 | Lab tour/Safety MSE software Lab I: What is in it and Why |
| Week 3 Oct. 12 | 6 7 8 | <ul style="list-style-type: none"> • Imperfections in Solids • Diffusion • Diffusion | 4: 1-10 5: 1-6 | 12: 5, 7 3: 27, 28, 40, 44 4: 1, 4, 12 Due Oct. 16 | Lab II: Symmetry and structure |
| Week 4 Oct. 19 | 9 10 11 | <ul style="list-style-type: none"> • Mechanical Properties (I) • Mechanical Properties (II) • Dislocations | 6: 1-5 6: 6-12 7: 1-6 | 5: 1, 3, 7 6: 4, 6, 24, 28 Due Oct. 23 | Lab III: Mechanical Testing |
| Week 5 Oct. 26 | 12 13 14 | <ul style="list-style-type: none"> • Strengthening Mechanisms • Failure (I) • Midterm Review | 7: 8-13 8: 1-6 1-8, 12: 1-4 | 7: 5, 6, 7, 15, 25, 26, 35 Due Oct. 30 | Study for midterm during lab |
| Week 6 Nov. 2 | 15 16 | <ul style="list-style-type: none"> • MIDTERM EXAM Nov 2 • Failure (II) • Teaching Feedback- Midterm Discussion - Phase Diagrams (I) | 1-8, 12: 1-4 8: 7-15 9: 1-6 | No HW | Lab IV: Work Hardening and Annealing |
| Week 7 Nov. 9 | 17 18 | <ul style="list-style-type: none"> • Solubility Limits • No Class • Fe-C, Phase Transformations (I) | 9: 7-15 9: 18-20 10: 1-4 (selected readings) | 8: 5, 13, 20, 31 9: 3, 8, 14, Due Nov 13 | NO LAB |
| Week 8 Nov. 16 | 19 20 21 | <ul style="list-style-type: none"> • Phase Transformations (II) • Heat Treatment and sword making • Properties of Ceramics | 10: 5-9 11: 1-9 12: 5-11 | 9: 32, 50 10: 9, 20 11: 30 Due Nov 20 | Lab V: Heat Treatment |
| Week 9 Nov. 23 | 22 | <ul style="list-style-type: none"> • Polymers • Polymer Properties • No Class | 14: 1-14 15: 1-14 | 12: 38, 46 14: 11, 22, 23 Due Nov 25 | NO LAB |
| Week 10 Nov. 30 | 23 24 25 | <ul style="list-style-type: none"> • Composites • Electrical Properties • Materials in Sporting equipment (K2) | 16: 1-10 18: 1-9 | 15: 5, 7, 19 16: 1, 3, 8 18: 1, 7 Due Dec 4 | Rewrite Lab I |
| Week 11 Dec. 7 | 26 27 28 | <ul style="list-style-type: none"> • Electrical properties (II) • Final Review or Nanomaterials • Final Review | 18: 10-15 | | Rewrite Lab I |
| | | Final Exam (Lecture A) | Tuesday Dec 15 th , 8:30-10:20 AM in MEB 246 | | |