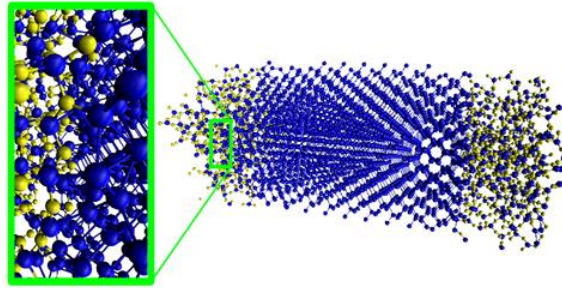


**MECH 210 Syllabus**  
*Materials Science and Engineering*



**Instructor Contact**

Dr. Nathan L. Anderson, [nlanderson@csuchico.edu](mailto:nlanderson@csuchico.edu), Office: OCNL 419A, Office Phone: (530) 898-5976

**Office Hours**

TR: 3-4:50PM

<https://csuchico.zoom.us/j/8375880302?pwd=TmNWdk5UMkwvUHczbU5MdXBIT0Nodz09>

Other times/locations may be available upon request. Times/locations also subject to change, updates will be sent via Canvas and email.

**Course**

Lecture/Discussion: MWF: 10-10:50AM LANG 300.

3.0 Unit Course Credit

Lab (MECH 210L): T: 11-1:50PM or R: 2-4:50PM OCNL 130.

1.0 Unit Course Credit

**Course Description**

Processing, structure, properties, and performance of engineering materials. Applied knowledge of material properties as engineering design parameters. Advanced manufacturing processes, including microfabrication are discussed.

**Prerequisites**

*Prerequisites:* CHEM 107 or CHEM 111, PHYS 202A or PHYS 204A.

*Corequisite:* MECH 210L for MECA, MECH, and SMFG majors only

**Text/Requirements**

*Recommended:* Callister, Rethwisch, Materials Science and Engineering: An Introduction, 8th or 9th Edition, Wiley (Any edition past 5th will work).

*Required:* Lab Manual, Available from Canvas.

*Required:* Laptop/computer with internet access to: Canvas, Zoom, and Microsoft Office (or similar Google, etc).

## Student Learning Objectives

Students are expected to acquire knowledge of the following major topics.

1. Atomic bonding, crystal structures and microstructures of materials
2. Defects and imperfections and their effects on properties of materials
3. Fick's Laws (steady-state and non-steady-state diffusion) and applications in manufacturing
4. Elastic and plastic deformation of materials
5. Viscoelastic behavior of polymers
6. Strengthening methods for materials
7. Introductory fracture mechanics
8. Mechanical testing (tensile, hardness, impact, fatigue) and material property determination
9. Phase diagrams and development of equilibrium and non-equilibrium microstructures
10. Isothermal transformation diagrams and applications in processing of metals
11. Introduction to polymeric, ceramic and composite materials
12. Processing methods and their effects on properties of materials
13. Basic optical, electronic and magnetic properties of material
14. Fundamentals of electrochemical corrosion, corrosion rate calculation, corrosion prevention
15. Oxidation of metals

## Homework

Homework assignments will be posted to Blackboard and will be due as noted. Homework will typically consist of computer and handwritten assignments to be uploaded to Blackboard. **Late homework will not be accepted!**

## Paper/Presentation

During this course you will be learning about various materials and at some point will select one specific material to write a paper and create a presentation about. The paper should have a detailed description of the processing, structure, properties, and performance of your material and submitted as a Word (Google Docs, etc). The presentation should highlight these things and be recorded as a voiced over Powerpoint (Google Slides, etc).

## Quizzes/Participation

Sometimes in class there will be in class breakout activities. There will also occasionally be short quizzes based on the homework or previous class discussion. These activities will all contribute to your Quizzes/Participation score.

## Exams

There will be two midterms and a final exam. The midterms will take place on the week denoted in the schedule at the regularly scheduled time. Final day/time will be announced when made available. The exams will NOT be cumulative. If extenuating circumstances prevent you from attending an exam, contact me as soon as possible for other arrangements to be made.

## Lab Activities (MECH 210L)

Standards and procedures for materials testing. Hands-on experience with commonly used equipment for materials testing. Test data acquisition and integration for material properties. Presentation of test

data and findings in technical reports. Separate syllabus will be posted for each lab section in Blackboard.

### Grading

Assignment Type	Contribution
Homework/Paper/Presentation	20%
Quizzes/Participation	20%
Exam #1	20%
Exam #2	20%
Final Exam	20%

If you feel that there is an error in the grading, please submit to me in writing a short statement of why you think that you deserved more credit along with the original graded work. This must be done within a week of the assignment being returned, or will lose consideration.

Final grades will be given according to the following distribution after the weighting above has been performed for each category.

Grade	Percentage
A	94-100%
A-	90-93%
B+	88-89%
B	83-87%
B-	80-82%
C+	78-79%
C	73-77%
C-	70-72%
D	60-69%
F	0-59%

Note: This distribution is subject to change during the course of the semester.

### Resources

There are a number of resources available to assist you through this course. In addition to coming to my office hours or scheduling a meeting with me, there is free tutoring available from multiple student organizations. There is also Supplemental Instruction (SI) available with our SI leader. My schedule/availability will be posted on the MMEM website, and additional meeting times can be scheduled in advance.

### Academic Integrity

Read and understand the university policy (<http://www.csuchico.edu/sjd/integrity.shtml>). Examples of academic dishonesty include: a) copying the work/assignment of others, and b) allowing others to copy yours.

### Americans with Disabilities Act

If you need course adaptations or accommodations because of a disability or chronic illness, or if you need to make special arrangements in case the building must be evacuated, please make an appointment

with me as soon as possible, or see me during office hours. Please also contact Accessibility Resource Center (ARC) as they are the designated department responsible for approving and coordinating reasonable accommodations and services for students with disabilities. ARC will help you understand your rights and responsibilities under the Americans with Disabilities Act and provide you further assistance with requesting and arranging accommodations.

### Accessibility Resource Center

530-898-5959

Student Services Center 170

[arcdept@csuchico.edu](mailto:arcdept@csuchico.edu)

### Schedule (Tentative)

Week	Lecture Topic	Lab (Note: Tentative labs)
1	Intro & Atomic Bonding	Safety/Groups/Excel
2	Crystalline Structure	SEM
3	Defects/Imperfections	XRD
4	Mechanical Properties	FTIR
5	Strengthening Mechanisms / Exam #1	Microscopy
6	Diffusion / Thermodynamics of Materials	Quiz #1
7	Phase Equilibria	Hardness Testing
8	Phase Transformations	Tensile Testing
9	Engineering Alloys	Strain Hardening
10	Polymeric Materials / Exam #2	Stress Concentration
11	Composite Materials	Quiz #2
12	Ceramic Materials	Impact Testing
13	Electronic, Magnetic, Optical Properties	Jominy End Quench
14	Thanksgiving Break	No Lab
15	Advanced Materials	Precipitation Hardening
16	Design Report Presentations	No Lab
17	Final Examinations	Quiz #3

*Note that modifications to the syllabus may be made throughout the semester. Please check back to Blackboard for the most current version. MECH 210L schedule will ultimately be determined by the lab instructor for your section.*