MECH 210 Syllabus
Materials Science and Engineering

Instructor Contact

Dr. Nathan L. Anderson, nlanderson@csuchico.edu, Office: OCNL 427, Office Phone: (530) 898-5976

Office Hours

TR: 3-4:50PM
https://csuchico.zoom.us/j/8375880302?pwd=TmNWdk5UMkwvUHc4U5MdXBIrJNodz09

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

Course

Lecture/Discussion: MWF: 10-10:50AM online.
3.0 Unit Course Credit
Lab (MECH 210L): T: 11-1:50PM or R: 11-1:50PM or R: 2-4:50PM online.
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

Required: Laptop/computer with internet access to: Blackboard Learn, 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 Friday of 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**

<table>
<thead>
<tr>
<th>Assignment Type</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework/Paper/Presentation</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes/Participation</td>
<td>20%</td>
</tr>
<tr>
<td>Exam #1</td>
<td>20%</td>
</tr>
<tr>
<td>Exam #2</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>94-100%</td>
</tr>
<tr>
<td>A-</td>
<td>90-93%</td>
</tr>
<tr>
<td>B+</td>
<td>88-89%</td>
</tr>
<tr>
<td>B</td>
<td>83-87%</td>
</tr>
<tr>
<td>B-</td>
<td>80-82%</td>
</tr>
<tr>
<td>C+</td>
<td>78-79%</td>
</tr>
<tr>
<td>C</td>
<td>73-77%</td>
</tr>
<tr>
<td>C-</td>
<td>70-72%</td>
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<tr>
<td>D</td>
<td>60-69%</td>
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<tr>
<td>F</td>
<td>0-59%</td>
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</tbody>
</table>

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

**Required Skills**

If at any time you are experiencing technical difficulties you should contact ITSS.

During this course you may be expected to:

- Use the chat, response, and poll features in Zoom.
- Use the text editor in Blackboard (or elsewhere; e.g., discussion board, blog, short-answer essay question).
- Submit assignments via Blackboard.
- Attach, open, or create pdf documents.
- Use email professionally (i.e., use proper tone, respond promptly, etc.).
- Watch an online video using a variety of video players (e.g., Quickime, YouTube, etc.).
- Create and post your own web video using a web camera.
- Create and post your own presentation using a variety of software (i.e., PowerPoint and Prezi).
- Take an online, traditional assessment (i.e., quiz, test).
- Take a screenshot.
- Hyperlink a URL.
Embed an image in a text document.
Edit an image.
Use chat applications-- both text and video.

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. My schedule/availability will be posted on the MMEM website, and additional meeting times can be scheduled in advance.

Online Etiquette

A distinguishing feature of any online class is that most communication occurs through the written word. Due to this the body language, voice, tone, and instantaneous listener feedback of a traditional class are all absent. Please take this into consideration when taking part in a discussion or class communication. Key points to consider:

- Respect others and their opinions
- Avoid inappropriate material
- Be forgiving
- Consider others privacy
- Use the right tone
- Be as concise as possible
- Stick to the point
- Take a pause before you send

Disruptive Behaviour

Students are required to adhere to the behavior standards articulated in the Campus Policies and Code of Student Conduct, and to refrain from disrupting classes and other academic settings. "Disruptive behavior" means conduct that materially and substantially interferes with or obstructs the teaching or learning process in the context of a classroom or educational setting.

Disruption in the classroom may include but is not limited to:

- Engaging in activities not related to the class, or other overt inattentiveness including but not limited to sleeping, talking to others, doing work for another class, reading the newspaper, checking e-mail, and exploring the Internet
- Monopolizing class discussion and refusing to defer to instructor, or listen to others; persisting when the instructor has indicated that the student’s remarks are off topic and it is time to move on
- Disputing authority or arguing with faculty and other students
- Inappropriate, disrespectful, or uncivil responses to the comments, opinions, presentations, etc. of others in the classroom
- Failure to adhere to the instructor’s rules or instructions
- Vulgar or obscene language, slurs, memes or other forms of intimidation
- Showing up to class under the influence of alcohol/drugs
- Threats of any kind
- Improper use of equipment, materials or resources
- Any behavior that puts the health or safety of the instructor or other students in the class in jeopardy
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

Schedule (Tentative)

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

Note that modifications to the syllabus may be made throughout the semester. Please check back to Blackboard for the most current version.