

California State University, Chico  
**MECH 210 – Materials Science and Engineering**  
Spring Semester 2023



**Instructor** Dr. Ozgul Yasar  
OCNL 424  
Phone: 530- 898-6142  
email: oyasar@csuchico.edu  
*Office Hours:* Mondays 11 am- 12 pm  
Wednesdays 11 am- 12 pm or by appointment

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

**Class Times** OCNL 254; MWF 9:00 – 9:50 am

**Textbooks** Materials Science and Engineering – An Introduction, 9<sup>th</sup> edition, by William D. Callister and David G. Rethwisch, Wiley & Sons, Inc., 2014  
ISBN-13: 978-1118477700

**Homework** Homework sets will be assigned for the semester. These problem sets will be posted on the Blackboard Learn class site. Problem sets must be submitted to the Blackboard Learn site at the start of the class period on the due date specified. Homework submitted after the specified deadline will receive no credit unless prior arrangements are made with the instructor, or there is an officially-verifiable illness or emergency. Tardiness or absence from class on the due date is not an excuse for late submission of homework.

**Tests** There will be quizzes, midterms, and a final exam for the semester. All tests are close-book. These midterms primarily cover the key topics discussed since the previous test. The final exam is comprehensive. Makeup tests will be given only with documented compelling reasons. Students will take the final exam on the day and time scheduled by the university. Time conflicts with other final exams should be brought to the instructor's attention as early as possible. Answers to the test problems should include relevant work in a logical order with explanation where necessary. When calculation is needed to arrive at a final answer, the formula(s) used along with numerical substitutions and correct units should be clearly shown. A complete and correct answer is necessary for full credits.

**Collaboration** Collaboration and discussion on the homework is encouraged in this class, but assignments turned in for a grade must be a student's own work. Consulting with your colleagues is fine, but copying from somebody else's homework solution is considered academic misconduct. (I strongly recommend that you first attempt every homework problem on your own, and only then meet with your colleagues to check and improve your work. The best learning usually comes after getting stuck on your own.) Academic misconduct will be referred to Student Judicial Affairs.

**Grading** The overall course grade will be based on homework, quizzes, project-presentation, midterms, and final exam.

Homework 15%  
Quizzes 15%  
Midterms 25%  
Project 15%  
Final Exam 30%

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	66-69	60-65	<60

**Catalog**

**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.

**Expectations**

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

1. Crystal structures and microstructures of metals, molecular structures of polymers
2. Microstructural imperfections and their effects on properties of metals and polymers
3. Fick's Laws (steady-state and non-steady-state diffusion) and applications in manufacturing
4. Elastic and plastic deformation of metals
5. Viscoelastic behavior of polymers
6. Strengthening methods for metals and polymers
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 steels
11. Polymeric materials
12. Selected non-ferrous alloy groups (aluminum, stainless), and cast irons
13. Processing methods and their effects on properties of metals, polymers, and composites
14. Simple property analysis of particular and fiber-reinforced composites
15. Fundamentals of electrochemical corrosion, corrosion rate calculation, corrosion prevention
16. Oxidation of metals

**Tentative Schedule, Spring 2023**

Week	Date	Topic	Reading
Week 1	1/23-1/27	Introduction, Overview of material property-structure relationships	Ch.1
Week 2	1/30-2/3	Atomic structure and interatomic bonding	Ch.2
Week 3	2/6-2/10	Crystal structures	Ch.3
Week 4	2/13-2/17	Crystallography	Ch.3
Week 5	2/20-2/24	Imperfections in solids	Ch.4
Week 6	2/27-3/3	Diffusion	Ch.5
Week 7	3/6-3/10	Diffusion Cont.	Ch.5
Week 8	<b>3/13-3/17</b>	<b>Midterm 1</b> <b>Spring Break</b>	<b>Enjoy</b>
Week 9	3/20-3/24	Mechanical properties of metals	Ch.6
Week 10	3/27-3/31	Mech. Prop. Cont.	Ch.6
Week 11	4/3-4/7	Dislocations and strengthening mechanisms	Ch.7
Week 12	4/10-4/14	Failure, fracture, fatigue, creep	Ch.8
Week 13	4/17-4/21	Phase diagrams, Gibbs phase rule <b>Midterm 2</b>	Ch.9
Week 14	4/24-4/28	Iron-Carbon system, Phase transformation development of Microstructure Applications and processing of metal alloys	Ch.9-Ch.10
Week 15	5/1-5/5	Polymer Structures	Ch.14
Week 16	5/8-5/12	Composites	Ch.16
Week 17	<b>5/15-5/19</b>	<b>Final Exam (TBA)</b>	

<b>Dropping and Adding Class</b>	Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc., found in the <a href="#">CSU Chico University Catalog</a> . You should be aware of the new deadlines and penalties for adding and dropping classes.
<b>Academic Integrity</b>	Students are expected to be familiar with the University's Academic Integrity Policy. Your own commitment to learning, as evidenced by your enrollment at California State University, Chico, and the University's Academic Integrity Policy requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the Office of Student Judicial Affairs. The policy on academic integrity and other resources related to student conduct can be found at: <a href="http://www.csuchico.edu/sjd/integrity.shtml">http://www.csuchico.edu/sjd/integrity.shtml</a>
<b>Americans with Disabilities Act</b>	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. If you need support to a class note taker, please see the link below. <a href="https://dss.csuchico.edu/NoteTaker.aspx?ntid=18984">https://dss.csuchico.edu/NoteTaker.aspx?ntid=18984</a>
<b>Accessibility Resource Center</b>	530-898-5959 Student Services Center 170 <a href="mailto:arcdept@csuchico.edu">arcdept@csuchico.edu</a>
<b>Student Learning Center</b>	The mission of the Student Learning Center (SLC) is to provide services that will assist CSU, Chico students to become independent learners. The SLC prepares and supports students in their college course work by offering a variety of programs and resources to meet student needs. The SLC facilitates the academic transition and retention of students from high schools and community colleges by providing study strategy information, content subject tutoring, and supplemental instruction. The SLC is online at <a href="http://www.csuchico.edu/slc">http://www.csuchico.edu/slc</a>