

California State University, Chico
MECH 430 – Nanoscale Science and Engineering
Spring Semester 2022



Instructor:	Dr. Ozgul Yasar Office: OCNL 424 Phone: 530-898-6142 Email: oyasar@csuchico.edu
Office Hours:	Monday 12 pm-2 pm and Wednesday 12-2 pm in OCNL 424 or by appointment Zoom Link for the Office Hours: https://csuchico.zoom.us/j/84573704867?pwd=dkZwZmZBVCTObzIYRG9ReVMwb0xXQT09
Class Days:	MWF 11:00 – 11:50 am in LANG 106
Course Description:	This course introduces students to the interdisciplinary field of nanoscience and engineering including the areas of engineering, materials science, chemistry, and physics. The topics covered include advanced materials, synthesis and modification of nanomaterials, properties of nanomaterials, materials characterization, nanofabrication methods, and applications. This course has three hours of lecture per week. It has three modules, which are formal lectures, guest speakers, and projects. For the projects, students will learn a conduct literature search on a given topic and be asked to present their project. They will further have a chance to propose their own ideas for potential applications and asked to give a detailed methodology to execute the project.
Course Prerequisites:	CHEM 111, PHYS 204B, or consent of instructor.
Textbooks:	Introduction to Nanoscience & Nanotechnology, G. L. Hornyak, H. F. Tibbals, J. Dutta, J. Moore, CRC Press. Journal papers in Science, Nature, Nanotechnology, and Applied Physics.
Recommended:	a) Introduction to Nanoscience, G. L. Hornyak, J. Dutta, H. F. Tibbals, and A. K. Rao, CRC Press, New York: 2008. b) Fundamentals of Nanotechnology, G. L. Hornyak, CRC Press, 2008 c) Introduction to Nanoscale Science and Technology, M.D. Ventra et al., Springer Verlag, 2004 d) Nanophysics and Nanotechnology, E. L. Wolf; Wiley, New York: 2004. Introduction to Nanoelectronics, V. V. Mitin, V. A. Kochelap, M. A. Stroscio, Cambridge University Press, Cambridge: 2008.
Course Objectives:	The objectives of this course are to introduce the fundamentals of nanoscience and applications in science and engineering to engineering, physics, and chemistry students and to provide opportunities to students to learn, study, and interact with each other in interdisciplinary applications of nanoscience and engineering.
Course Outcomes:	Students will have an understanding and knowledge of nanoscience and engineering in principles and applications, and also gain the ability to critically read journal papers and propose potential projects.

Topics Covered:

1. Historical perspective of nanomaterials.
2. Advanced materials.
3. Materials, structure, and nanosurface.
4. Energy at nanoscale.
5. Nanoscience phenomena, bulk to quantum properties.
6. Characterization techniques.
7. Fabrication methods of nanomaterials, “bottom-up”, “top-down” fabrication.
8. Chemical synthesis and modification of nanomaterials.
9. Non-thermal plasma technique to synthesize nanomaterials.
10. Nano-electro mechanical structures (NEMS).
11. Applications.

Journal Reviews:

The purpose of “Journal Review” is to relate the course materials to current applications. During the semester, students will find recently published journal papers related to the course materials. They will submit a review of the article of their choice, which will describe the purpose, methods, and key points of the research.

Final Group Project:

Teams of 3-4 students will submit a final group project, which includes the comprehensive write-up and power point presentation. The list of the areas that is related to each discipline will be given to the students. A specific topic will be chosen by each team. Final group project should address literature review, propose and design a new research idea or application, or propose a solution to the challenges for the current applications.

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 Basis:

Homework Assignments	20%
Midterm	25%
Project Review	25%
Final Project	30%

Grade	A	B	C	D	F
	>90	80-89	70-79	60-69	<60

Dropping and Adding Class

Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc., found in the [CSU Chico University Catalog](#). You should be aware of the new deadlines and penalties for adding and dropping classes.

Academic Integrity

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:

<http://www.csuchico.edu/sjd/integrity.shtml>

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
Student Learning Center	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 http://www.csuchico.edu/slc
Reminder	The CSU requires students to be fully vaccinated and boosted against COVID-19 by February 28, 2022 , unless you have an approved exemption. Currently, Chico State is requiring everyone on campus to wear an approved face covering in all indoor campus spaces. Accordingly, all students are required to wear an appropriate face mask covering the nose and mouth in order to participate in this course. Policies and requirements regarding COVID-19 are subject to change pursuant to campus, local, state and/or federal guidelines. Please note that dishonesty relating to the vaccination policy and/or your failure to comply with any other COVID-19 related safety policy or mandate, including the face covering requirement, may result in disciplinary action against you through the office of Student Conduct, Rights and Responsibilities, which can include suspension or expulsion from the California State University system. Individuals unable to wear a face covering due to a medical condition should contact the Accessibility Resource Center by phone at (530) 898-5959 or by email at arcdept@csuchico.edu.