

Syllabus - SMFG 477
Semiconductor Manufacturing

Instructor

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Office

OCNL 427, Office Phone: (530) 898-5976

Course Meeting Times

Tuesday and Thursday 12:30 – 1:45PM

Course Description

Upper division course introducing the manufacturing processes for various classes of semiconductor electronic devices. Materials presented will focus on solar cells and logic/memory semiconductor devices. The primary process covered will be photoresist lithography, however during the various manufacturing steps of these devices parallel processes are introduced including silicon ingot growth, ion implantation, chemical vapor deposition, atomic layer deposition, and molecular beam epitaxy. In addition to the various processes, students will learn the fundamental performance barriers for each material/device type and perform defect analysis to assess how defects can be used to improve or degrade these materials. Finally, students will study the financial aspects of these industries including the capital equipment costs associated with the manufacturing of these materials/devices, the financial history of these industries, return on investment, amortization, and case studies of both industry failures and successes.

Textbooks and Resources

Recommended but not required

Introduction to Semiconductor Manufacturing Technology – Second Edition, Hong Xiao, SPIE Press, 2012, ISBN: 9780819490926

Chemistry and Lithography, Uzodinma Okoroanyanwu, SPIE/Wiley, 2010, ISBN: 9780819475626

Prerequisites

SMFG 211 or MECH 210

Office hours

Office hours are tentatively set for the following days and times:

Wednesday 12:00 – 1:50PM

Thursday 2:00 – 3:50PM

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

Homework

Homework assignments will be posted to Blackboard and will be due at the start of class on Thursday's, with exceptions for holidays. Homework will typically consist of take home computer and handwritten assignments. **Late homework will be docked 10% per class meeting late!**

Exams

There will be a midterm and a comprehensive final exam. Both will take place in class at the regularly scheduled time. Final location will be announced. If extenuating circumstances prevent you from attending an exam, contact me as soon as possible for other arrangements to be made.

Final Exam: TBD

Grading

Homework	20%
Activities/Presentations	20%
Midterm Exam	25%
Final Exam	25%
Participation	10%

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.

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.

Activities/Presentations/Participation

Sometimes during lecture time there will be in class activities and short presentations given by groups of students. These activities will all contribute to your “Activities/Presentations” score. There will also occasionally be short quizzes based on the reading or previous class discussion. Often, time will be given to complete the quiz and then the solution discussed, so only attending class is required for full credit. These quizzes will all contribute to your “Participation” score.

Resources

There are a number of resources available to assist you through this course. In addition to coming to one of my office hours or scheduling a meeting with me, there is free tutoring available from multiple student organizations. My availability will be posted on my office door, 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

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

Schedule (Tentative)

Week	Topic
1	Introduction
2	Integrated Circuit Fabrication Basics
3	Semiconductor Basics
4	Wafer Manufacturing, Epitaxy, and Substrate Engineering
5	Thermal Processes
6	Photolithography
7	Plasma Basics
8	Midterm Exam
9	Ion Implantation
10	Etching
11	Chemical Vapor Deposition and Dielectric Thin Films
12	Metallization
13	Chemical Mechanical Polishing
14	Process Integration
15	Integrated Circuit Processing Technology
16	Future Trends and Technologies
17	Final Exam