



FLORIDA INTERNATIONAL UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

EEE 5427C Adv Nanofab

Instructor : Dr. Nezhil Pala and Dr. Chunlei Peggy Wang
Lab Manager : Patrick Roman
Office Hours : TBA – Please check FIU Canvas
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Classroom/Time: TBA

Reserved Computer Labs: TBA

Web Page : Class notes are available on FIU Canvas - <http://canvas.fiu.edu/login/>

Catalog Description:

This course will give the students an introduction to micro/nanofabrication tools and techniques. It includes lab sessions where the students design, fabricate and test selected micro-scale devices.

Textbook : *“Introduction to Microfabrication”* 2nd Ed., Sami Franssila ISBN-10: 0470749830, ISBN-13: 978-0470749838

Course Objectives:

The purpose of this course is to

1. To give the students an understanding of the standard micro and nanofabrication techniques and the issues surrounding them.
2. To give the students an overview of the major classes, components and applications of nanosystems and the fundamental principles behind the operation of these systems.
3. To apply the knowledge of nanofabrication techniques for designing a micro system.

Relationship of course to program outcomes:

In the courses EEE 5427C Adv Nanofab and EGN 5013C Nano-scale Fab and Synth the student will have to show

- a. an ability to apply knowledge of mathematics, science, and engineering
- b. ability to design and conduct experiments, as well as to analyze and interpret data
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- e. an ability to identify, formulate, and solve engineering problems
- f. an understanding of professional and ethical responsibility
- g. ability to communicate effectively
- j. a knowledge of contemporary issues
- k. an ability to use the techniques, skills and modern engineering tools necessary for engineering practice



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Grading Scale		FIU Code of Academic Integrity http://academic.fiu.edu/academic_misconduct.html
A	95.1 - 100	"Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook."
A-	91.1 - 95	
B+	87.1 - 91	
B	83.1 - 87	
B-	79.1 - 83	
C+	75.1 - 79	
C	70.1 - 75	
D	50.1 - 70	
F	< 50	

Department Regulations Concerning Incomplete Grades

To qualify for an Incomplete, a student:

1. Must contact (e.g., phone, email, etc.) the instructor or secretary before or during missed portion of class
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course
4. Must see the Instructor. All missed work must be finished before last two weeks of the following term.

University policies: on sexual harassment, and religious holidays, and information on services for students with disabilities

<http://academic.fiu.edu/>

<http://drc.fiu.edu>



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Policies:

- **Academic Misconduct:** For work submitted, it is expected that each student will submit their own original work. Any evidence of duplication, cheating or plagiarism will result at least a failing grade for the course.
- **Unexcused Absences:** Two unexcused absences are permitted during the term. More than two will result in the loss of points from your final grade. (**1 point** per absence above two, **3 points** per absence above 5).
- **Excused Absences:** Only emergency medical situations or extenuating circumstances are excused with proper documentation. After reviewing documentation you are **required to email** a description of the excuse and absence dates as a written record to **npala@fiu.edu**.
- **On Time:** As in the workplace, on time arrival and preparation are required. Two “lates” are equivalent to one absence. (Leaving class early is counted the same as tardy.)
- **Deadlines:** Assignments are due at the beginning of the class period on the date specified. Assignments submitted late (within 1 week) will receive **half credit**.
- Instructor reserves right to change course materials or dates as necessary.

Grading Scale: NOTE: There are *no makeup exams* offered

Topic	Percentage
Quizzes	5 %
Lab Effort	25 %
Final <i>no makeup</i>	25 %
Grad assignments	10 %
Homework	10 %
Final Report	25 %
TOTAL	100%

I have read and acknowledge the policies and procedures described in this Syllabus

Name _____ Date _____



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Class Schedule: Once a week, 75 minutes each session: Wednesdays and 2 ½ -hour lab once a week

Week	Date	D	Topic	Homework
Week 1	Lect #1	Wed	Introduction - Pressure Sensor Overview	
	LAB #1		NO LAB	
Week 2	Lect #2	Wed	Wheatstone Bridge Primer	
	LAB #2		Synopsis intro	
Week 3	Lect #3	Wed	Cleanrooms - Simulations & Layout Design	
	LAB #3		Simulation	
Week 4	Lect #4	Wed	Pattern Generation & Optical Lithography	
	LAB #4		Layout Editor intro	
Week 5	Lect #5	Wed	Optical Lithography	HW#1 Due
	LAB #5		Process Flow, Test vehicles, Backside layout	
Week 6	Lect #6	Wed	Advanced Lithography	
	LAB #6		Mask Making	
Week 7	Lect #7	Wed	Crystal Struct - Micrometrology and Materials Char	HW#2 Due
	LAB #7		Photolithography	
Week 8	Lect #8	Wed	Wafer Cleaning and Surface Prep	HW#3 Due
	LAB #8		Metallization (by Evaporation)	
Week 9	Lect #9	Wed	Thin-Film Materials and Processes	HW#4 Due
	LAB #9		Lift-Off	
Week 10	Lect #10	Wed	Etching I	HW#5 Due
	LAB #10		Backside Lithography	
Week 11	Lect #11	Wed	Etching II	HW#6 Due
	LAB #11		Dry etch patterning by RIE	
Week 12	Lect #12	Wed	Thermal Oxidation - Diffusion	HW#7 Due
	LAB #12		Bulk Silicon Etch (in KOH)	
Week 13	Lect #13	Wed	Ion Implantation - CMP Chem-Mechanicl Polishing	
	LAB #13		Metrology	
Week 14	Lect #14	Wed	CMOS Fabrication	HW#8 Due
	LAB #14		Testing	
Week 15	Lect #15	Wed	MEMS Process Integration - Yield	
	LAB #15		Metrology	
Week 16			FINAL WEEK FINAL EXAM TIME & PLACE	
Week 17	LAST DAY TO SUBMIT THE GRADES			