

Syllabus for ECSE/MTLE 6300 - Integrated Circuit Fabrication Laboratory

Course Instructor and Coordinator:

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TA: TBD

Catalog Description:

Theory and practice of IC fabrication in a research laboratory environment. Test chips are fabricated and the resulting devices and circuits evaluated. Processes and fabrication equipment studied and used include oxidation/diffusion, CVD reactors, photolithography, plasma etching, vacuum evaporator, ion implantation, etc. Instruments used in process monitoring and final testing include thin film profilometer, ellipsometer, resistivity probe, scanning electron microscope, capacitance-voltage system, etc. The fundamentals of hazardous material handling and clean room procedures are studied.

Prerequisite: ECSE 4250 or equivalent.

When Offered: Spring term annually.

Cross Listed: Cross listed as MTLE 6300.

Credit Hours: 3

Textbook: Optional (not required)

Sze, Simon M., VLSI Technology, 2nd Ed., McGraw-Hill, 1988.

Sze, Simon M., Physics of Semiconductor Devices, 2nd Ed., John Wiley & Sons. Inc., 1981.

Digital Platforms for Learning:

WebEx Space link: webexteams://im?space=be137d80-9dd4-11ee-8b6e-b9e3d154812e

LMS and Gradescope.

Computing

Students need access to a UNIX system. They will use telnet or other means to access the unix system operated by the ECSE Department to perform process numerical simulations. Course notes, homework, and other materials are available via FabLab homepage:

<http://www.ecse.rpi.edu/courses/S24/ECSE-6300/index.html>, LMS and WebEx.

Grading

Unit Quizzes.....	32%
Lab Participation.....	20%
Final Project Report.....	32%
Homework.....	16%
Best Poster Competition.....	Award

Academic Integrity and Policy: we follow the “The Rensselaer Handbook of Student Rights and Responsibilities” & Graduate Student Supplement to Handbook (Rights & Responsibilities):
<https://info.rpi.edu/dean-students/student-rights-responsibilities-and-conduct>;
<https://rpi.app.box.com/s/itdt9diqmjkfj2luqhe8irxf99f9pntu>;
<https://rpi.app.box.com/s/zwvn5kfyx2xl3cm1bq8bgw9rlkyqx8jf>

Class/Lab Schedule:

Week	Lecture	Action/Process Steps	Lab	HWs	Quiz
1 8-Jan	1. Introduction / Safety	No Lab Course Organization	-	-	-
11-Jan	2. Diffusion in Si				
2 15-Jan	MLK Day, no lecture	Field Oxidation	1	1	1
18-Jan	3. Thermal Oxidation + SUPREM				
3 22-Jan	4. Photolithography	M1 Active Area: Photolithography & Oxide Wet Etch	2		2
4 29-Jan	5. Dielectrics and Poly-Si Deposition	Gate Oxidation, Poly-Si Deposition and Doping;	3		3
5 5-Feb	6. Ion Implantation	M2 Poly-Si Gate: Poly-Si/Oxide Etch, S/D Ion Implantation (@ Vendor)	4	2	4
6 12-Feb	7. Plasma-Assisted Etching	ILD Deposition and Densification & Implant Activation	5		5
7 20-Feb	8. Metallization (Tuesday)	"M5" Contacts: ILD RIE Etch for Contacts	6		6
8 26-Feb	9. MOSFET	Al/Si Contact - Sputtering Deposition	7	3	7
9 (3/4)	Spring Break				
10 11-Mar	10. Device Characterization	"M6" Metallization: Al/Si Wet Etch	8		
11 18-Mar	None	Etch Backside Deposit Al/Si on Back, Sinter	9	4	8
12 (3/25)	None	Device Testing Device Testing			
13 (4/1)	None	Device Testing			
14 (4/8)	None	Device Testing			
15 (4/15)	None	Device Testing			
16 (4/22)	Poster Competition	Final Report Due			