

Syllabus
ECE 571—Microelectronic Fabrication
ECE Department, UMass Amherst
Spring 2017

Course Instructors: Prof. J. Joshua Yang, 201G Marcus Hall, jjyang@umass.edu

Office Hours: Yang: Wed/Fri: 1:30-2:30 pm or by appointment

TAs: James Kestyn: jamkes78@gmail.com

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First meeting: 1/24/2017, Tuesday

Organization: *Lecture* – Tues/Thurs 11:30 - 12:45 AM, Hasbrouck Laboratory room 136

Lab – one session each week, Marcus 15A

Enrollment: limited to 20 students

Prerequisites: ECE 344 or equivalent background

Credits: 4 (with lab) (**NO audit**)

Grading: 50% Laboratory (*If your chip fails and you have to get raw data from other people's chip, you should let the TA know and the analyses should be your own*); 20% Exam 1; 20% Exam 2; 10% Homework (5 highest scores out of 6 homeworks); 2 fastest ring oscillator awards (each gets a notch up in final grade, e.g., A- to A)

Course Goals

- To introduce basic technologies and knowledge of IC fabrication.
- To fabricate semiconductor devices and integrated circuits starting from bare silicon wafers.
- To test devices/circuits and analyze their performance using your knowledge in semiconductor physics and electronics.

Lecture Topics:

- Overview of IC fabrication
- Semiconductor Crystal Growth
- Substrate Preparation and Cleaning
- Thermal Oxidation and Gate Dielectrics
- Optical Lithography
- Dopant Diffusion and Ion Implantation
- Wet and Dry Etching
- Thin Film Deposition
- Metallization and Interconnection
- Bonding, Packaging and Yield

Course Materials:

- *Required:* Fabrication Engineering at the Micro-and Nanoscale, by Stephen A. Campbell, Oxford University Press, 4th edition.
- *Recommended:* Introduction to Microelectronic Fabrication, by Richard C. Jaeger, Prentice Hall, 2002. 2nd edition.
- *Recommended:* Microchip Fabrication: A Practical Guide to Semiconductor Processing, by Peter Van Zant, McGraw-Hill, 2014. 6th edition.
- *Recommended:* Silicon VLSI Technology: Fundamentals, Practice, and Modeling, by Pummer, Deal and Griffin, Prentice Hall, 2000, 1st edition.
- Lab manual, handouts, and lecture notes (Moodle).