

EE 527: Solid-State Laboratory Techniques (Microfabrication)

Spring Quarter 2017

Department of Electrical Engineering

Course Description: The course covers principles and techniques for the fabrication of micro and nanoscale integrated circuits and Micromechanical Systems (MEMS). Instruction time is evenly split between lectures and cleanroom labs that emphasize fabrication best practices, chemical safety, layout and mask making, photolithography, wet and dry etching, and dielectric and metal deposition using high vacuum and plasma processing equipment. Process integration and troubleshooting will be highlighted.

Course Goals: To introduce and train students in safe and controlled fabrication laboratory techniques used in the microelectronics and nanotechnology fields.

Prerequisites: Graduate standing or permission of instructor.

Textbook: Sami Franssila, Introduction to Microfabrication, 2nd Ed. John Wiley & Sons, Ltd., 2010. ISBN = 978-0-470-74983-8.

Lectures will cover the following topics:

1. Overview of fabrication, cleanroom protocols, and lab safety
2. Design and Layout
3. Diffusion
4. Dielectric Deposition
5. Metal Deposition
6. Lithography
7. Wet and Dry Etch
8. Back-End-of-Line (Packaging) and other techniques

Class Information:

Lecture Instructor: Dr. Michael Khbeis (khbeis@uw.edu)

Office Hours: M 5:00-6:00pm or by appointment

Lectures: M 6:00-8:50pm in Fluke 119A

Labs: M 6:00-9:50pm in Fluke 115 (WNF Cleanroom) – 4 sessions alternating weeks with lecture (2 sections)

Lab Instructors: Dr. Darick Baker (darick@uw.edu)

Mark Brunson (brunson@uw.edu)

TAs: Naveen John (navjohn@uw.edu)

Course Grading: Lab participation (30%), Homework (20%), Individual report (20%), and Group Project (30%)

Lab: Since the core content of this course is fabrication techniques, lab participation and attendance is mandatory. A total of 4 labs will be offered in alternating weeks of lecture with 2 course sections. Students may elect to change lab sections if a planned absence or conflict occurs. Missed labs cannot be made up. Homework will be related to lectures.

Individual reports: will be a study of fabrication-related topics.

Project: Groups of 2-4 students will collaborate on a literature search of modern fabrication techniques and apply those techniques to address unique processes or applications that demonstrate application of the course content. Understanding of fabrication processes and related applications will be presented in a short written report and oral presentation.