

## **EE 527: Solid-State Laboratory Techniques (Microfabrication)**

Spring Quarter 2015

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, controlled 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:** Michael Khbeis ([khbeis@uw.edu](mailto:khbeis@uw.edu))

**Office Hours:** T 5:00-6:00pm or by appointment

**Lectures:** T 6:00-8:50pm in Fluke 332 (C4C Idea Lab)

**Labs:** T 6:00-9:50pm in Fluke 125 (WNF Cleanroom) – 4 sessions alternating weeks with lecture (2 sections)

Lab Instructors: Andrew Lingley ([alingley@uw.edu](mailto:alingley@uw.edu))  
Darick Baker ([darick@uw.edu](mailto:darick@uw.edu))

TAs: Di Sun ([dxs535@uw.edu](mailto:dxs535@uw.edu))

Course Grading: Lab participation (40%), Homework (20%), Individual report (10%), 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 lab activities. Individual reports will be a culmination of the labs.

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. Understanding of fabrication processes and related applications will be presented in a short written report and oral presentation.