**EE 328L Microcircuit Fabrication Lab**

**Credits:** 1

**Categorization of credits:** engineering topic

**Instructors or course coordinator:** Aaron Ohta

**Textbook and Other Required Materials:**

* Required: “Silicon VLSI Technology,” by Plummer, Deal and Griffin (Prentice Hall).
* References:
	+ “The Science and Engineering of Microelectronic Fabrication,” by Stephen A. Campbell (Oxford)
	+ “Micromechanics and MEMS, Classic and Seminal Papers to 1990”, Edited by William Trimmer.

**Designation:** Elective

**Catalog Description:**

EE 328L Microcircuit Fabrication Lab (1) (1 3-hr Lab) Hands-on laboratory where students make various electronic and electromechanical micro-devices using IC technology. Devices are also tested and analyzed. Pre: 324 or consent. Co-requisite: 328. DY

**Pre-requisites:** EE 327 Theory and Design of IC Devices. **Co-requisite:** EE 328 Microcircuit Fabrication

**Class/Lab Schedule:** One 3-hour lab per week

**Topics Covered:**

* CMOS IC processing techniques (1 week)
* Clean room principles (2 weeks)
* Lithography (2 weeks)
* Oxidation (1 week)
* Doping Techniques (1 week)
* Thin Film Deposition (1 week)
* Etching (1 week)
* Back-End Technology (2 weeks)
* MEMS (2 weeks)

**Course Objectives and Relationship to Program Objectives:**

A student should demonstrate ability in (i) IC processing techniques (ii) MEMS techniques, (iii) use of lab equipment, (iv) and design of experiments and analysis of data. [Program Objectives this course addresses: 1, 2, 4 ]

**Course Outcomes and Their Relationship to Program Outcomes**

The following are the course outcomes and the subset of Program Outcomes (numbered 1-7 in square braces "[ ]") they address:

* Design fabrication processes to realize semiconductor and electromechanical functions. [1, 3, 6]
* Understand the relationship between material science, chemistry, semiconductor theory, mechanical engineering, circuit theory, circuit layout, and processing techniques. [1]
* Use of processes, fabrication tools and clean-rooms. [1, 6, 7 ]
* Characterize process outcomes. [1, 6]
* Communicate solutions to fabrication challenges to others. [2, 3, 4, 6]

**Contribution of Course to Meeting the Professional Component**

Engineering topics: 100%

**Computer Usage:**

Computers are used for mask designs and MEMS simulations and presentation preparation in about 80% of assignments.

**Design Credits and Features:**

1 design credit. Device design and relationship to layout, materials and processes available, and design of process flows.

**Person Preparing Syllabus and Date:** V. Lubecke, Oct. 7, 2014. Modified by A. Ohta, Jan. 14, 2021.