Nanofab Lab-based Courses

ME EN 2960 Foundations of Microsystems
A "hands-on" introduction to the world of micro and nanosystems for engineering students. Students understand the wealth of existing applications and future inventive possibilities at the micrometer and nanometer scale. Laboratory exercises consist of dissection of IPOD MP3 players, building solar cells, and sensor design. Students introduced to Bottom-up (Atomic building blocks) and Top-down (Lithography, Deposition) approach to micro and nanotechnology. Visualization by Scanning Electron Microscopy.

ECE 5202 / MSE 5202 Integrated Circuit Microfabrication
Fundamentals of integrated circuit fabrication, basic understanding of IC processes and the effect of processing choices on device performance. Students learn to use process simulation tools and also fabricate and characterize devices in the laboratory. Processing techniques and design methodologies of microfabrication will be covered. Process modules will be discussed: lithography, thermal oxidation, diffusion, ion implantation, etching, thin-film deposition, epitaxy, and metatization. Process simulation and layout design rules aimed toward the fabrication of Metaloxide-Semiconductor MOS devices and process integration will also be covered. The laboratory part of the course will provide hands-on experience to fabricate and characterize a CMOS chip.

ECE 5221 / ME EN 5050 Fundamentals of Micromachining Processes
Introduction to the principles of micromachining technologies. Topics include photolithography, silicon etching, thin film deposition and etching, electroplating, polymer micromachining, and bonding techniques.

ECE 5961 Practical Scanning Electron Microscopy
Cross listed with PHYS 5739 and MetE 7910
Students learn multiple advanced microscopy applications using state-of-the art imaging tools and analytical peripherals (EDS, EBSD, XRF).

ECE 5074 / MSE 5074 Photovoltaic Materials & Solar Cells
Course will examine the physics and engineering of photovoltaic devices and the materials used in them, augmented by labs in which the students will fabricate and test simple Si solar cells.

ECE 6225 Microsystems Design and Characterization
Cross listed as METE E 6055, BIOEN 6423, ME EN 6055, CHFEN 6659
This course generalizes microsystems design considerations with practical emphasis on MEMS and IC characterization/physical analysis. Exposure to reverse engineering (SEM) and process optimization/ control (DOE, SPC, GR&R)

ECE 6231/7231 Microsensors and Actuators Lab
Design and simulation of microsensors and actuators, process design, packaging and assembly, characterization and testing of microsensors and actuators as well as reliability issues. Fabrication & characterization of fully functional microsensors or actuators.

ECE 6962 Heterogeneous Microsystems Technologies
A student project course, in which students research or invent microscale devices and then design, simulate, fabricate, and characterize devices. Sandia University Alliance.

ECE 7960 Surface Chemistry & Analysis
Cross listed as CHEM 7780 and METE E 7910
Introduction to physics and chemistry of solid surfaces. The lab section of the course is designed to provide a working knowledge for the operation of the Kratos Axis Ultra XPS/AES/ISS surface analysis system

ECE 6962 Complex Microsystems Integration and Packaging
Lectures and lab focus on students building complex integrated microdevices inside the Utah Nanofab.