Semiconductor Process Technology

ECE 5031

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Discrete and integrated circuit device design, silicon VLSI processing technologies, III-V compound semiconductor device fabrication technologies; epitaxy, doping, bandgap engineering; and device measurements and failure mechanisms.

Prerequisites and Co-requisites:
Prereq: 3030, or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.

Course Goals / Objectives:
- Learn about the processing technologies used for fabrication of silicon VLSI integrated circuits
- Develop an understanding of process integration for NMOS, CMOS and MOS memory IC technology
- Exposed to silicon process information pertinent to the interface between process engineers and integrated circuit design engineers
- Learn about processing technology of compound semiconductors
- Learn about methods and techniques used for fabricating compound semiconductor devices used in communications, optoelectronics, high speed wireless applications
Course Topics:
- Overview of CMOS process
- Lithography – contact, projection, e-beam
- Vacuum and ultra-high vacuum physics and technology
- CVD and silicon epitaxy
- Wet chemical processing
- Plasma processing (etching, sputtering, PECVD)
- Atomic layer deposition
- Ion implantation and diffusion
- Back end processing – interconnects and CMP
- CMOS and MOS memory process integration
- III-V semiconductor bulk crystal growth techniques
- Semiconductor epitaxial growth methods - molecular beam epitaxy and metal organic CVD
- Ohmic contact formation for III_V and III-nitride semiconductors
- Compound semiconductor device process integration
- Schottkey contact formation for III-V and III-nitride semiconductors
- Fabrication of III-V and III-nitride semiconductor diodes and transistors

Designation:
Elective