Descriptions of Courses

EE561 Introduction to VLSI Devices

This course covers fundamental VLSI device physics for graduate students. After a brief review of basic quantum mechanics and semiconductor processes, the lecturer will cover basic principles of operation in semiconductor devices including PN junction, MOS Capacitor, MOSFET and bipolar transistors with a strong emphasis on deep submicron secondary effects of MOSFET and bipolar transistors for extensive understanding of advanced device engineering.
(Prerequisite: EE362)

EE571 Advanced Electronic Circuits

This course introduces new analysis methods for analog-circuits implemented by using bipolar and MOS transistors. Since the design of analog circuit requires both approximation and creativity, this course explains how to approximate and design complicated circuits.
(Prerequisites: EE304, EE403)

EE661 Solid State Physics

The course will cover basic physics and applications of various solid state materials such as metals, semiconductors, dielectrics, thermoelectric materials, and magnetic materials. Also are included the various physics of nanostructures such as quantum well, quantum wire, quantum dots.

EE676 Analog Integrated Circuits

This course deals with advanced level of analog circuits emphasis on CMOS. The topics include wideband operational amplifiers, comparators, Switched capacitor filters, ADC, DAC, continuous time filters, etc.
(Prerequisite: EE571)

EE678 Digtal Integrated Circuits

This course is designed to expose students to the important issues in high performance CMOS circuit design. This course covers the data path design in full custom design methodology, clocking strategy, and the state-of-the art CMOS logic styles.

EE762 Advanced MOS Device Physics

This course will cover advanced device physics of MOSFETs and their ultimate scaling. Recent trends such as a new device structure and a new material will be introduced, and various types of memory devices as an example of detailed applications are also covered. Through a depth of study in quantum effects, reliability issues, and modeling, this course can provide core knowledge of next device technologies and a chance to explore new applications.

PH611 Advanced Solid State Physics I

This course is intended to provide graduate students in physics, chemistry, electrical engineering, and materials science with a graduate-level understanding of topics in solid state physics. Topics include: Brillouin zone, Crystal symmetry, Phonons, Electron energy band theory, Electron-electron and electron-phonon interactions, Electron dynamics, and Transport properties.
Prerequisites: PH503 and PH504

PH613 Semiconductor Physics

This course is designed to provide graduate students in physics, chemistry, electrical engineering, and materials science with an ability to understand the scientific and technological backgrounds of

semiconductors and related devices. Topics include: electronic structure and optical properties of semiconducting materials, defects and impurities, electron transport, electron/optical devices and device structures.
Topical Prerequisites: Schrödinger equation and Hamiltonian, crystal structure and lattices, Boltzman and Fermi-Dirac distributions, Bloch theorem.
Prerequisites: PH611 and PH612

PH711 Physics of Magnetism

This course introduces from the physics of macroscopic magnetic properties of magnetic materials to the spintronics that handles individual spins quantum mechanically. Topics include the Origin of magnetism, Magnetic domain, Magnetic anisotropy, Magnetoresistance and spin tunneling.

MS536 Thin Film Processing

This course is planned to give graduate students in Materials Science and Engineering an understanding of the process and analysis technologies of thin films

MS635 Semiconductor Integrated Process Design

Since unit processes for VLSI manufacturing are related to each others, it is necessary that semiconductor engineers have a deep understanding about issues between the VLSI process integration and device operation. This course provides basic science underlying unit process steps, particular engineering in achieving required device performances, and the tradeoffs in optimizing device performance and enabling manufacturing. It assumes that the student has already acquired an introductory understanding of the semiconductor device physics.

MS642 Electronic Packaging Technology

This course covers electronic packaging technologies such as electronic design, thermal consideration, mechanical design, reliability and failure mechanism, chip interconnection, chip packaging, printed board technology, soldering, ceramic packaging, and multi chip packaging.

MS684 Principles of Semiconductor Devices

This course covers the basic physics, operation principles, and processes of semiconductor devices. This course provides the thinking tools for materials scientist to develop or improve the device characteristics, which are closely related to materials science such as structures, bulk defects, interface defects, thermodynamics, and kinetics.