

PPST Undergraduate Courses of Interest

Chemical and Biological Engineering

CBE 441	Chemical Reaction Engineering	Stoichiometry and mechanisms of chemical reaction rates, both homogeneous and catalytic; adsorption, batch, continuous flow, and staged reactors; coupling between chemical reaction rates and mass, momentum, and energy transport; stability; optimization of reactor design. Application to environmental and industrial problems. Three lectures. Prerequisites: thermodynamics, 341.
CBE 445	Process Control	A quantitative study of the principles of process dynamics and control. Dynamic behavior of chemical process elements; analysis and synthesis of linear feedback control systems with special emphasis on frequency response techniques and scalar systems. Three lectures. Prerequisite: differential equations, which may be taken concurrently.

Electrical Engineering

EE 341	Solid-State Devices	The physics and technology of solid-state devices. Topics include: p-n junctions and two terminal devices, transistors, silicon controlled rectifiers, field effect devices, silicon vidicon and storage tubes, metal-semiconductor contacts and Schottky barrier devices, microwave devices, junction lasers, liquid crystal devices, and fabrication of integrated circuits. Three hours of lectures. Prerequisite: 208 or the equivalent.
EE 441	Solid-State Physics I	An introduction to the properties of solids. Theory of free electrons—classical and quantum. Crystal structure and methods of determination. Electron energy levels in a crystal: weak potential and tight-binding limits. Classification of solids—metals, semiconductors, and insulators. Types of bonding and cohesion in crystals. Lattice dynamics, phonon spectra, and thermal properties of harmonic crystals. Three hours of lectures. Prerequisite: 342, or PHY 208 and 305, or equivalent.
EE 453	Optical Electronics	Electromagnetic waves. Gaussian beams. Optical resonators. Interaction of light and matter. Lasers. Mode locking and Q-switching in lasers. Three hours of lectures. Prerequisites: 351 or 352 or PHY 304 or permission of instructor.

Mechanical and Aerospace Engineering

MAE 433	Automatic Control Systems	Introduction to the analysis and design of automatic control systems. Mathematical models of mechanical and electrical feedback systems. Block diagram algebra. Accuracy, speed of response, and stability. Root locus, Bode, and Nyquist techniques. Introduction to digital control. Regulation, tracking, and compensation. Effects of nonlinearity, disturbance, and noise. Prerequisite: 305 or instructor's permission. Two 90-minute
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lectures. Laboratory mini-project.