

EEE 4420 – Introduction to Nanodevices

Catalog Description: (3cr) Physical principles of modern solid-state devices and their applications, quantum mechanics and fundamentals of nanoelectronics.

Prerequisites: EEE 3396 or equivalent

Textbooks: J. Singh, *Modern Physics for Engineers* (recommended) and instructor lecture notes

Course Objective: The main goal of this course is to teach engineering students the fundamentals of quantum mechanics useful for applications in nanoelectronics.

Professional Component: 3 credits of Engineering Science

Instructor: Prof. Ant Ural

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Teaching Assistant: n/a

Class Schedule:
3 classes per week of 50 minutes each

Meeting Times: Tu 8-9/ Th 9

Meeting Location: BEN 328

Grading: Homework, Midterm exam, Final exam

Course outline:

I) Introduction

Wave-particle duality, de Broglie's hypothesis

II) Modern formulation of quantum mechanics

Schrodinger's equation (time dependent and time-independent), wavefunctions, wavepackets, uncertainty principle, expectation values, operators

III) Particles in simple potentials

Free particle, particle in a box, square quantum well, tunneling phenomena

IV) More advanced topics