**Course Topics**

**EEE 631: Advanced Optoelectronics**

**Prerequisite:** EEE531, EEE637 and basics of quantum mechanics, solid states and

semiconductor physics

**Course Description:** Principles of heterojunctions and quantum well structures, band lineups, optical, and electrical properties. Introduces heterojunction devices. Knowledge of transport and recombination theory, pn and Schottky barrier diodes, bipolar and junction field-effect transistors, and MOS capacitors and transistors. is required to be successful in this course.

**Course Topics**

• Introduction

• Band lineups at hetero-interfaces

• Electronic states in quantum wells

• Band structures for bulk and heterostructures

• Modulation doping and self-consistent bandstructure calculation

• Optical properties of semiconductors

• Many-body interactions in semiconductors

• Optical characterization techniques

• Semiconductor lasers and LEDs based on advanced heterostructures

• Quantum dot detectors

• Intersubband transitions in advanced heterostructures

• Basics of intersubband transitions, quantum cascade lasers, THz lasers, QWIPs

• Multi-junction solar cells