

# EC575 Physics of Semiconductors Devices

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## Class Syllabus

### ⇒ **Part I – Introduction and Review of Quantum Mechanics and Semiconductor Physics**

- Review of Quantum Mechanics
- Review of Semiconductor Physics
- Survey of Semiconductor Material Properties.
- Band Structure Calculation - Pseudopotential.

### ⇒ **Part II – Carrier Transport Models**

- Advanced Carrier Transport Models: BTE
- Drift Diffusion
- Monte Carlo Methods

### ⇒ **Part III – Heterostructures**

- Review of p-n junctions.
- p-N and P-n heterostructures

### ⇒ **Part IV – BJT and HBTs**

- The Bipolar Junction Transistor: Basic Theory and Limitations.
- The Heterojunction Bipolar Junction Transistor

### ⇒ **Part V – Mesfet, Modulation Doping and HEMTs**

- Modulation Doping Fundamentals
- High Electron Mobility Transistor

⇒ **Part VI – Photodetectors**

- Detection Fundamentals
- Photodiodes and p-i-n detectors
- Avalanche Photodetectors

⇒ **Part VII – Multi-Quantum Wells and Superlattices**

- Effective Mass Approximation
- Solution of the Schrödinger equation for the MQW
- Carrier Transport in MQWs
- Real Space Transfer
- Application to RTD and QCs.