

ECE 572 Optoelectronics

Fall 2011

Instructor: A.P. DeFonzo

Text: The Physics of Solar Cells-J. Nelson
Photovoltaic System Engineering, Messenger and Ventre

Time: Mon-Wed-Fri 9.05 -9.55

Office Hours: Mon-Wed 10 -11 Rm 121 Marston

Place: Eng. Lab rm 327

Description: Optoelectronics from the perspective of photovoltaic cells (emphasis) and light emitting diodes. Intermediate semiconductor physics supporting the advance analysis of p-n junctions will be studied. Monocrystalline and thin film devices analyzed . Methods of managing light will be introduced. Strategies for high efficiencies will be discussed. The foregoing will be discussed in the context of system designs .

Lectures will follow the following topical progression :

Introduction

Photons In Electrons Out: Photovoltaic

Electrons in Photons Out : Light Emitting Diode

Power Generation

Cell Characteristics

Photons in , electrons Out: Basis Principles

Electrons and Holes in Semiconductors

Generation and Recombination

Junctions

Analysis of p-n junction from perspective of photon effects

Monocrystalline Devices

Thin Film Devices

Managing Light

Beyond the Limits: High Efficiency

Grading : Midterm 30% ; Final 40% ; assignments 30%