"Solar Cell Design and Processing"
Fall 2004

Class Meeting Details:

Registration #07832 - 3 Units. Class meets from 11:30 to 12:50 on Mondays and Thursdays.

Instructor:

Dunbar P. Birnie, III, Professor
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Campus phone: 732-445-5605
Office: CCR 212

Design Content:

This class will be heavily Design oriented and will be aimed to satisfy 2 units of Engineering Design according to ABET specifications.

Grading:

Occasional in-class activities: 20%
Individual HW's: 20%
Semester Design Project (Individual or Small Team): 30%
Mid-Term Test: 15%
Final Exam: 15%

Office Hours:

TBA

Class Website:

A class website will be created and will contain frequent updates of useful material including data sets for used in HW's as well as solutions to selected problems and tests.

Material Coverage:

I. Introduction

A. The Available Solar Spectrum
B. Absorption of Light by Matter
C. Material Electronic Structure: The Band Gap
D. p-n Junction Formation and Internal Fields
E. p-i-n Structures
F. Motion of Electrons and Holes
G. Generation and Recombination Processes
H. Macro-Electrical Characteristics

II. Standard Semiconductor Processing

A. Diffusion
B. Oxidation
C. Photolithographic Patterning

III. Techniques for Depositing Thin Films

A. Evaporation
B. Sputtering
C. Solution Deposition Techniques
D. Heterojunction Devices

IV. Contact Formation

A. Ohmic Contacts
B. Transparent Conductors
C. Metallization
D. Series Resistance Effects

V. Optical Effects

A. Anti-Reflection (AR) Coatings
B. Refraction and Non-Normal Illumination
C. Textured surfaces for Light Trapping
D. Dual- and Multi-Junction Cells