Electronic Properties of Materials - Course Syllabus

Course Number: MSE 302

Course Title: Electronic Properties of Materials

Academic Semester:	Spring	**Academic Year:**	2015/ 2016
Semester Start Date:	Jan 24, 2016	**Semester End Date:**	May 19, 2016

Class Schedule: (Sun/Tue and 9am)

Classroom Number:

Instructor(s) Name(s): Lain-Jong Li
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Office Location: Building 5 Office 3337
Office Hours:

COURSE DESCRIPTION FROM PROGRAM GUIDE

This course offers an overview of the electronic, optical, magnetic and thermal properties of materials, not limited to solid state. It covers the fundamental concepts of band structure and bonding of materials, electrical and thermal conduction in metals, semiconductors and dielectric. The interaction between light and matter will be addressed and important concepts such as excitons will be introduced. Finally magnetism will be introduced.

COMPREHENSIVE COURSE DESCRIPTION

Course Topics

• Crystal Structure & Diffraction

• Structure of Atom

• Bonding in Materials

• Band Formation

• Electron, Holes and current

• Junctions

• Semiconductor Devices

• Light Emission and Detection

• Thermal Properties and Phonons

• Novel Materials

GOALS AND OBJECTIVES

This course offers an overview of the electronic properties of materials. There is an emphasis in lectures on fundamental physical models to understand the crystal structure and bonding, band structure of solids, carrier properties and p-n junctions. With the basis, students will be able to have clear concepts on electrical behaviors of metals and semiconductors. This course will also introduce key electronic devices based on homo p-n junctions and hetero-junctions. A brief review of thermal and phonon properties will be given.

REQUIRED KNOWLEDGE

No official pre-requisite, but prior exposure to electronic materials or solid state physics class will be useful.

REFERENCE TEXTS

Principles of Semiconductor Devices by Neamen

METHOD OF EVALUATION

Percentages %	Graded content
50% **50%**	**Midterm Exam** **Final Exam**

COURSE REQUIREMENTS

Assignments

14 Lecture notes and 4 Problem Sheets

Course Policies

It is strongly suggested not to skip any lecture since all lectures are related. It may be difficult to follow up if one lecture is skipped.

NOTE
The instructor reserves the right to make changes to this syllabus as necessary.