Class Syllabus

ENMA460/PHYS431 – Introduction to the Physics of Solid Materials

Spring 2020

Course Instructor: Prof. Johnpierre Paglione
Quantum Materials Center, Department of Physics
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Extension: 57115, e-mail: paglione@umd.edu
Office Hours: by appointment

Teaching Assistant (TA): Nick Poniatowski (nponiat@umd.edu)
Office Hours: Tuesday TBD

Class Hours:
Mondays and Wednesdays 5PM-6:15PM
Classroom: PHYS 1402 (John S. Toll Physics Building)

Textbook: Introduction to Solid State Physics, Eighth Edition by Charles Kittel
Reference: The Oxford Solid State Basics by Steven Simon
Supplemental reading materials will be distributed or posted online when needed.

Course Website: ELMS-Canvas

Course Objectives/Goals

The purpose of this course is to introduce students to the basics and fundamental concepts of properties of solid materials. The topics include crystal structures, diffraction techniques, formation of crystals, phonons, transport properties, and band gaps. Physical and mathematical basis for understanding the properties of solid materials will be presented. Some experimental techniques and contemporary topics will be covered.

Expected Outcome

After taking this course, students should have a good understanding of basic properties of solid materials. The course is designed to stimulate interests in modern topics in materials science and physics. The topics are laid out in such a way so that students can then go on to advanced topics in materials science such as electronic materials. The course will also serve as a good prerequisite to the graduate level solid state physics/electronics course taught in physics, electrical engineering and/or materials science departments.

Grading Scheme:

Homework:	30%	(weekly)
Quizzes	5%	(weekly on Canvas)
Midterm:	30%	**(around Spring break time TBD)**
Final:	35%	**(TBD)**

Homework:

Weekly problem sets are posted on Canvas, and will be due each Wednesday at the beginning of class (5pm).

Lecture Topics	**# of lectures**	**Chapter**
Crystal Structure	2	1
Crystal Diffraction	3	2
Crystal Binding and Cohesive Energy	3	3
Phonons I	3	4
Thermal Properties of Phonons	4	5
Metals and Free Electron Models	4	6
Energy Bands	3	7
Semiconductors	3	8
Superconductors, Magnetic, Topological materials, etc	2	10 + other
Total number of lectures	28	