

PHY 6938, Introduction to Solid State Physics (Fall 2024)

Instructor: Dr. Inna Ponomareva; Office: ISA 5103; E-mail: iponomar@usf.edu; telephone: 974-7286
Text: Solid State Physics, 1st edition; Publisher: Brooks/Cole; Authors: Neil W. Ashcroft and N. David Mermin

Recommended books:

Introduction to Solid State Physics by Charles Kittel

The Oxford Solid State Basics by Steven H. Simon (electronic version free for USF students)

Hack Your Brain: Secrets of an Elite Manhattan Tutor, by Elie Venezky and Patrycja Slawuta

The Little Book of Talent: 52 Tips for Improving Your Skills, by Daniel Coyle

Make It Stick: The Science of Successful Learning, by Peter C. Brown, Henry L. Roediger III, Mark A. McDaniel

Other recommended resources: Solid State Physics online lectures by Stephen Simons (available from <https://www.youtube.com/@learnphysics7686/playlists>)

Other requirements: computer, internet connection, webcam and microphone, in case we have to switch to on-line mode

Class: TR 11:00am-12:15pm ISA 4027

Office Hours: WF 9:30 am-10:30 am and by appointment.

Course Outline and Objectives

The course presents an introduction to the subject of Solid State Physics. It covers nearly all its major concepts but at somewhat elementary level. It aims to provide foundation in the subject and develop physics intuition for crystalline matter. The topics covered can be found in the tentative scheduled on the next page. The classic textbook by Ashcroft and Mermin is used. The main ideas are understood and re-enforced by developing conceptual knowledge and problem-solving skills. Problems will be assigned from most chapters of the text. In addition, conceptual questions will be offered. Two randomly chosen problems from the homework may be graded. The homework will be due at the beginning of the first lecture of the next topic (clearly given in the tentative schedule on the next page). In addition, there will be a quiz for each of the topics that emphasizes basic concepts of the material learned. I will give exact dates for these quizzes about one week in advance. Mini-quizzes may be given in each class and the best seven results will be used for the grade. In studying for the quizzes and examinations you are encouraged to work on problems in the book in addition to those assigned. Please read the text before each lecture.

Course Grading Breakout.	Homework Problems	10 %
	Mini-quizzes	10 %
	Quizzes	20 %
	Mid-term Exam	30 %
	Final Exam	30 %

Course Grading: each problem/question (except for the ones for mini-quiz) will be graded on a scale 0-4, and the average grade for the assignment will be computed. More specifically,

- 0 the concept comprehension/skill has not been demonstrated or attempt at solution is not sound
- 1 the problem solved or question answered about 25%
- 2 the problem is half solved or question is half answered
- 3 the problem solved or question answered about 75%
- 4 the problem is fully solved or question is fully answered

The GPA-inspired scale will be used to assign final letter grade for the course:

3.7 – 4.0 A	1.7 – 1.9 C
3.3 – 3.6 A-	1.3 – 1.6 C-
3.0 – 3.2 B+	1.0 – 1.2 D+
2.7 – 2.9 B	0.7 – 0.9 D
2.3 – 2.6 B-	0.3 – 0.6 D-
2.0 – 2.2 C+	0.0 – 0.2 F

For non-physics majors and physics majors already completed their course work grade of C and higher can be replaced with S(atisfactory).

Tentative Schedule and Examination Dates

Week Beginning	Topics (Chapters in Text)
Aug 25	Free electron theory (1-3)
Sep 1	
Sept 8	First exposure to periodicity (4-7)
Sept 15	Electron in periodic potential (8-11)
Sept 22	
Sept 29	Semiclassical mechanics (12-17)
Oct 6	Mid-term on Chapters 1-17 plus Quiz on Chapters 12-17 Thurs Oct 10
Oct 13	Classification of solids (19-20)
Oct 20	Lattice vibrations (21-26)
Oct 27	
Nov 3	Insulators and semiconductors (27-29)
Nov 10	
Nov 17	Surfaces and defects (18,30)
Nov 24	Magnetism and superconductivity (31-34)
Dec 1	
Dec 8	FINAL on Chapters 18-34 plus Ch. 31-34 Quiz on Tuesday Dec 10, 10:00 AM – 12:00 PM

NOTES

Students who anticipate being absent from exams due to a major religious observance must provide notice of the date(s) and event(s) to the instructor, in writing, by the second class meeting. Notes and Tapes are not permitted for purposes of sale.

Any student with a disability is encouraged to meet with me privately during the first week of class to discuss accommodations. Each student must bring a current Memorandum of Accommodations from the Office of Student Disability Services (974-4309, SVC1133) which is prerequisite for receiving accommodations. Accommodated examinations through the Office of Student Disability Services require at least two weeks notice.

USF has a set of central policies related to student recording class sessions, academic integrity and grievances, student accessibility services, academic disruption, religious observances, academic continuity, food insecurity, and sexual harassment that apply to all courses at USF. Be sure to review these online: usf.edu/provost/faculty-success/resources-policies-forms/core-syllabus-policy-statements.aspx

COVID NOTE

If class is to be moved on-line due to COVID we will continue meeting during the regular class times via zoom or other software. Webcamera, microphone, computer and internet are required for that. For examinations we will use on-line proctoring (honorlock).