

PHYS 927 – Solid State Physics

Fall Semester 2022

September 8, 2022

Instructor

Robert Streubel | Office: Jorgensen Hall 310C | Email: streubel@unl.edu

Office Hours: Tuesdays and Thursdays after class, or by appointment

Grader: Yifei Hao (yfhao)

Pre-requisites: PHYS 912 and 916

Lectures: Tuesdays and Thursdays, 12:30 thru 13:45, JH 247

Textbooks

Primary: Solid State Physics, Ashcroft & Mermin

Secondary (alternative): Introduction to Solid State Physics, Kittel

Course Overview

Course Objectives

This course gives an introduction to solid state physics, with particular emphasis on crystalline metallic and semiconducting materials. A time investment of **at least 10 hours per week** is needed in addition to lecture.

Course Activities

Lecture. The two lecture sessions introduce the fundamentals of solid state physics.

Homework. There will be homework every week assigned at the first class of the week and due the following week in class.

Exams. There will be two 75-minute midterm exams and one two-hour comprehensive final exam. They will both be closed book.

Paper. As a group of two to three students write and submit a course paper by **December 2**. Topic and outline must be discussed with Instructor by **September 13**. The paper shall be a literature review of an advanced modern topic in solid state physics of your choice with the ultimate goal to prepare a scientific publication for submission by yourselves. Before you start, make arrangements and decide on responsibilities. You do not want to have this discussion half way through.

Canvas. Class information, including syllabus, announcements, materials etc. will be posted and updated on the UNL Canvas page.

UNL Course Policies and Resources. Students are responsible for knowing the university policies and resources found at <https://go.unl.edu/coursepolicies>.

Exams and Grading

Mid-term Exam (in-class): Thursday, October 13

Final Exam: 7:30 thru 9:30 on Friday, December 16

Grading Scale

The grades will be determined from your final score using the table below. The table shows the lower cutoff for a grade. For example, if your score is greater or equal to 80% but less than 85% you will get a B+.

Score	95	90	85	80	75	70	65	60	57	53	50
Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D

Homework 35%

Mid-term exam 15%

Final exam 30%

Course paper 20%

A single instance of academic dishonesty may result in a failing grade for the course. Academic dishonesty includes copying solutions for homework, recitations, or exams either from another student or from existing solutions, whether published or not. Students are allowed to discuss homework with each other, but copying is considered cheating. For more examples of what is considered academic dishonesty, see the Student Code of Conduct (<http://stuafs.unl.edu/ja/code/three.shtml>).

Course Content

Set 1

1. Free electron gas theory of metals
2. Periodic systems: crystal structure, Bloch's theorem, band structure

Set 2

3. Lattice excitations: harmonic crystals (classical, quantum)
4. Semiconductors
5. Magnetism

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.