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+.

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<th>Score</th>
<th>95</th>
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<tr>
<td>Grade</td>
<td>A+</td>
<td>A</td>
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<td>B+</td>
<td>B</td>
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<table>
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<tr>
<th>Homework</th>
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<td>Mid-term exam</td>
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<td>Final exam</td>
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<td>Course paper</td>
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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.