PHZ6426 Solid State I Course Syllabus

Lectures

Lectures will take place every Monday, Wednesday, and Friday from August 20 through December 4 **except** September 2 (Holiday), October 4 (Homecoming), November 11 (Holiday), November 27 and 29 (Thanksgiving). Classes will be held 6th period (12:50–1:40 p.m.) in NPB 1220.

Instructor

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Office Hours: Wed 2 p.m.–3:30 p.m.

Grader
TBD

Course Overview

PHZ 6426 is an introduction to the quantum theory of crystalline solids, the foundation of much of modern condensed matter physics. It is intended for students working in condensed matter physics and for those who would like a general background in solid-state physics. Any condensed matter physicist, experimentalist or theorist, should master the material covered in this course. You should come away familiar with the fundamentals of the subject, and better equipped to understand issues currently at the forefront of the field.

This course is also a prerequisite for more advanced course, such as PHZ 6424 (optical properties), PHZ 7427 (solid state II), and PHZ 7428 (special topics).

You can view archived material for previous years: Fall 2016 (Links to an external site.)Links to an external site., Fall 2013 (Links to an external site.)Links to an external site., Fall 2011 (Links to an external site.)Links to an external site., and Fall 2008 (Links to an external site.).Links to an external site.

Textbook

The course text is *Solid State Physics* by Ashcroft and Mermin (Brooks/Cole, Cengage Learning, 1976). The text is required, meaning that you will be assumed to have access to it to complete reading and homework assignments.

There are other useful textbooks on Solid State Physics. They offer different perspectives on the topic and you are encouraged to explore. Here are a few:

- Charles Kittel "Introduction to Solid State Physics", 7th Edition, John Wiley, 1996
- Charles Kittel "Quantum Theory of Solids", 2nd Edition, John Wiley, 1987.
- Joseph Callaway "Quantum Theory of the Solid State", 2nd Edition, Academic Press, 1991. (The "Student Edition" is a simpler, lower level version, but is also an interesting read if you want to quickly know what solid state physics is about)
- P. M. Chaikin and T. C. Lubensky "Principles of Condensed Matter Physics", Cambridge University Press, 1995.
- J. M. Ziman "Electrons and Phonons", Oxford University Press, 1960.
- R. H. Silsbee and J. Dräger "Simulations for Solid State Physics", Cambridge University Press, 1997.

Here is an interesting and popular book that can give you some mathematical background and additional food for thought

- David Hilbert and S. Cohn-Vossen "Geometry and the Imagination" 2nd edition, AMS Chelsea Publishing, 1991.

Prerequisites

Graduate-level quantum mechanics and statistical mechanics (and to a lesser extent electromagnetism) will be assumed, but no prior experience of solid state physics is necessary.

Homework

There will be a homework set approximately every two weeks. The homework is your best opportunity to learn the material in depth. If at all possible, do the homework entirely on your own. Only if you are hopelessly stuck is it alright to seek help from the instructor or other students. Any help must be explicitly acknowledged at the end of the corresponding problem. In that case you will not be penalized for having received help. Because the number of problems solvable analytically is limited, some problems will involve numerical solutions, most likely with Python, which I will introduce in class.

Estimated schedule

Week 1: Ch. 1

Week 2: Ch. 2, 3

Week 3: Ch. 4-6

Week 4: Ch. 8,9

Week 5: Ch. 10,11

Week 6: Ch. 12

Week 7: Ch. 13

Week 8: Review and midterm

Week 9: Ch. 14-16

Week 10: Ch. 17,18

Week 11: Ch. 19-22

Week 12: Ch. 23-24

Week 13: Ch. 25-27

Week 14: Ch. 28, Thanksgiving

Week 15: Ch. 28,29

Week 16: Review and Final

Grades and grade points

The final grade will be based on:

Homework	60%
Exam 1	20%
Exam 2	20%

Tentative grading scheme (subject to change):

A	100%	to 94%
A-	< 94%	to 90%
B+	< 90%	to 85%
B	< 85%	to 80%
B-	< 80%	to 75%
C+	< 75%	to 70%
C	< 70%	to 60%
C-	< 60%	to 50%
D+	< 50%	to 40%

D	< 40%	to 30%
D-	< 30%	to 20%
F	< 20%	to 0%

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx (Links to an external site.)Links to an external site.

Attendance requirement

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx (Links to an external site.)Links to an external site..

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Online course evaluation

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu (Links to an external site.)Links to an external site.. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results (Links to an external site.)Links to an external site..

Academic honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*" You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment*."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code (Links to an external site.)Links to an external site..