

CORNELL UNIVERSITY
PHYS 4454 /AEP 4500 /AEP 5502
Introductory Solid State Physics
Fall 2024

Course instructor

Kenji Yasuda 235 Clark Hall kenji.yasuda@cornell.edu
Office hours: Monday 5:00 - 6:00 PM

Teaching Assistant

Yuxin Jiang 218 Clark Hall yj546@cornell.edu
Office hours: Friday 11:30 AM - 12:30 PM

Course secretary/registrar

Danyel Wierson dw442@cornell.edu

Lectures T/R 10:10 - 11:25 AM 294D Clark Hall
 No lectures: October 15 (Fall Break)
 November 28 (Thanksgiving Break)

Discussion R 3:45 - 4:35 PM 200 Savage Hall
 No discussion: November 28 (Thanksgiving Break)

Course website Go to the PHYS 4454 site at <https://canvas.cornell.edu/>
 Homework assignments and solutions will be posted.

Goals of the course

- conceptual/qualitative understanding of solids state physics
- development of tools and recipes for doing real calculations
- introduction to some subjects that are in current research
- introduction to some technologically relevant subjects

Contents

	Simon	Ashcroft and Mermin
• Crystal Structures	Ch. 12	Ch. 4
• Diffraction	Ch. 13,14	Ch. 5,6
• Vibrations of solids (phonon)	Ch. 8-11	Ch. 22,23
• Electronic structures of solids	Ch. 2,4,15,16	Ch. 8-11
• Transport properties of electrons	Ch. 3	Ch. 1,2,12,13
• Semiconductor Physics	Ch. 17,18	Ch. 28,29

Prerequisite: PHYS 4443, AEP 3620, or CHEM 7930.
Recommended corequisite (not mandatory): AEP 4230.

Textbook

“The Oxford Solids State Basics” by Steven H. Simon
He also makes the draft version (with a bit of a typo) free:
<https://www-thphys.physics.ox.ac.uk/people/SteveSimon/condmat2012/LectureNotes2012.pdf>
“Solid State Physics” by Ashcroft and Mermin.

Lectures

Lectures are an important component of this course and students will be responsible for the material presented in lectures.
We will use Poll Everywhere during the lecture. Please bookmark:
<https://pollev.com/kenjiyasuda531>

Homework	Problem sets will be assigned approximately weekly and due on Tuesday at 9am. Submit problem sets on Canvas. A 24-hour grace period will be allowed for homework submission, i.e. submission by Wednesday at 9am, with a 15% penalty. I will drop your lowest homework score for the semester. Please use it wisely. If you want to request a regrade because of the mistake in the scoring, you must bring it up with the TA within 1 week of the grades being posted.		
Exams	There will be three exams: two preliminary exams and a final exam. These exams will cover material from lecture. Homework problems may appear on the exams. Preliminary exam: Friday, Oct 18, 7:30 PM, Physical Sciences Building 120 Final: TBD by registrar later in the semester		
Grading	Problem sets:	20%	
	Prelim exam:	35%	
	Final exam:	45%	

Communication

All communication will be by email or through Canvas. If you email, in the subject line include both “PHYS 4454” and a short description of your question or issue. Keep your message short and to the point. We will respond as promptly as feasible.

Academic Integrity

Students expected to abide by the Cornell University *Code of Academic Integrity* with work submitted for credit representing the student’s own work. **Discussion of homework assignments is permitted and encouraged, however, any work submitted for academic credit should be the student’s own work.** Course materials posted on Canvas are intellectual property belonging to the author. Students are not permitted to buy or sell any course materials without the express permission of the instructor. Such unauthorized behavior will constitute academic misconduct. Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com (or a similar page) for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site.

Exam conflicts and accommodations

If you have an SDS accommodation or there is a conflict under Cornell policy (more than 3 exams in 48 hours or direct conflict) then it might be necessary to take an exam at a different time than the rest of the class. You are responsible for telling me more than a week before the exam that an accommodation is required.