

SUNY Geneseo, Department of Physics and Astronomy

PHYS 386: Solid State Physics

Syllabus, Spring 2012

Prof. James McLean

Office: ISC (old Greene) 228G

Phone: 245-5897

Website: <http://www.geneseo.edu/~mclean/>

E-mail: mclean@geneseo.edu

Summary Course Website: <http://www.geneseo.edu/~mclean/SolidState/>

Full Course Website in mycourses.geneseo.edu

Learning Outcomes:

This course covers the basics of the physics of crystalline materials. You will become familiar with the concepts and terminology from the topics of classical and semi-classical models, crystal structure, lattice vibrations/phonons, the quantum mechanical description of electrons in crystals, and the physical principals underlying solid state electronics. In each area, you should also become proficient with the basic calculation methods.

Times and places:

Lectures: ISC 229, Tue. and Thu., 10:00–11:15am

Exams: ISC 229, two Thursdays during the term, 7:00–9:00pm (subject to approval by the class)

Final Exam: ISC 229, on Mon., May 7, 8:00–11:00am

Office hours: Tue. and Thu. 12:30–3:00pm

I am also available at other times; see the schedule on my web site. Just stop by my office, or to ensure that I'll be there, contact me by phone or email.

Required materials:

Textbook: *Solid State Physics*, by N. Ashcroft and N. D. Mermin

You might also find *Introduction to Solid State Physics*, by C. Kittel, useful.

Required coursework (with fraction of final course grade):

40% Homework: assigned more or less weekly, normally due Thursday by 4:00pm.

Roughly 50% of homework problems will be graded in detail. The remainder will be graded for effort; it will be your responsibility to review the posted solutions to assess correctness.

10% Quizzes: To be held occasionally, always announced in the previous class.

30% Exams: Two exams, each worth 15% of the course grade.

20% Final Exam: The final will concentrate mostly on the last third of the course.

However, material from the whole course is fair game.

Exam Schedule:

Exam 1: Thu., Mar. 1 7:00 – 9:00pm (subject to approval by the class)

Exam 2: Thu., Apr. 12 7:00 – 9:00pm (subject to approval by the class)

(Note that there will be two class periods skipped, Feb 7 and the day of Exam 2.)

Final Exam: Mon., May 7 8:00 – 11:00am

General Comments:

In a small class of friends, be careful not to cross the line between “getting help on homework” and “copying homework.” Rule of thumb: don't be looking at someone else's work at the same time as you are writing your own.

If you need to return materials to me outside of class, your best option is to bring it to my office. Slide it under my door if I'm not in. Homework will be accepted for full credit if it is in my hands before solutions are posted. After this, partial credit may be given.

SUNY Geneseo will make reasonable accommodations for persons with documented physical, emotional or learning disabilities. Students should consult with the Office of Disability Services (106A Erwin, 245-5112) and their individual faculty regarding any needed accommodations as early as possible in the semester. Further information is available at <http://disability.geneseo.edu/>.

Rough Schedule

WEEK OF...	LECTURE TOPICS	EXAM
Jan. 16	Chapter 1: Drude Model	
23	Chapter 2: Sommerfeld Model	
30	Chapter 3: Shortcomings of Semiclassical	
Feb. 6 (only Th)	Chapter 4: Crystal Structure: 2D & 3D	
13	Chapter 5: The Reciprocal Lattice	
20	Chapter 6: X-Ray Crystallography	
27	Chapters 19 & 20: Types of Crystal Binding	Exam 1
Mar. 5	Chapter 22: Classical Phonons	
12 (no class)	SPRING BREAK	
19	Chapter 23: Quantum Phonons	
26		
Apr. 2	Chapter 8: The Free Electron Fermi Gas	
9 (only T)	Chapter 9: Nearly Free Electrons: Energy Bands	Exam 2
16 (only Th)		
23	Chapter 28: Homogeneous Semiconductors	
30 (only T)	Chapter 29: Inhomogeneous Semiconductors; the Diode	
May 7 (W)		Final Exam