

SUNY Geneseo, Department of Physics and Astronomy

## PHYS 386: Solid State Physics

Syllabus, Spring 2008

Prof. James McLean

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Course Website: <http://www.geneseo.edu/~mclean/SolidState/> and in myCourses.geneseo

### 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: in Bailey 128, Mon., Wed., and Fri. 12:30–1:20am

Exams: in Bailey 128, two Thursdays during the term, 7:00–9:00pm (subject to approval by the class)

Final: in Bailey 128, on Wed., May 14, 12:00–3:00pm

Office hours: Mon. & Wed. 1:30–3:00pm, Thu. 12:30–2:00pm

I am also available at other times. See my schedule on my web site. 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: Normally assigned more or less weekly, generally due on Friday.

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: Thursday, February 28 7:00 – 9:00pm (subject to approval by the class)

Exam 2: Thursday, April 10 7:00 – 9:00pm (subject to approval by the class)

Final: Wednesday, May 12 12:00 – 3:00pm

Note that there is no lecture on the Fridays Feb. 15 and Apr. 11.

### General Comments:

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 solutions are posted, 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 Director in the Office of Disability Services (Tabitha Buggie-Hunt, 105D Erwin, [tbuggieh@geneseo.edu](mailto:tbuggieh@geneseo.edu)) and their individual faculty regarding any needed accommodations as early as possible in the semester. Further information available at <http://disability.geneseo.edu/>.

## Rough Schedule

We may well deviate from this schedule. Exam material will be adjusted accordingly.

<b>WEEK OF...</b>	<b>LECTURE TOPICS</b>	<b>EXAM</b>
Jan. 21 (only WF)	Chapter 1: Drude Model	
28	Chapter 2: Sommerfeld Model	
Feb. 4	Chapter 4: Crystal Structure: 2D & 3D	
11 (only MW)	Chapter 5: The Reciprocal Lattice	
18	Chapter 6: X-Ray Crystallography	
25	Chapters 19 & 20: Types of Crystal Binding	Exam 1
Mar. 3	Chapter 22: Classical Phonons	
10	Chapter 23: Quantum Phonons	
17 (no class)	SPRING BREAK	
24		
31	Chapter 8: The Free Electron Fermi Gas	
Apr. 7 (only MW)	Chapter 9: Nearly Free Electrons: Energy Bands	Exam 2
14		
21	Chapter 28: Homogeneous Semiconductors	
28	Chapter 29: Inhomogeneous Semiconductors; the Diode	
May 5 (only M)		
May 12 (W)		Final Exam