Physics 475, Solid State Physics I

Winter Quarter 2015, 1pm MWF

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Course goals, objectives, and outcomes:

A couple of important *goals* of Physics 475 are
(i) for the student to develop an understanding, at the microscopic level, of why the materials around us exhibit many of the diverse optical, electronic, chemical, and mechanical properties that they do. For example why are certain elements good electrical conductors and others not? Why are certain materials optically transparent?
(ii) to understand how these materials and properties may be put to use in modern high-tech engineering applications. For example how is a pn junction made and how does it work? How does a light emitting diode work?

Specific *objectives* for the course are to work through the first 30% or so of the standard text: *Introduction to Solid State Physics* by Charles Kittel. Topics covered will include basic crystallography, reciprocal space, x-ray diffraction, crystal binding and vibrations (phonons), thermal properties, the free electron Fermi gas, and energy band and semiconductors. An important component of Physics 475 is the weekly problem assignment where all students will be required to complete, and submit for grading, a number of problems closely related to the week's lecture material.

Assessment of how well the course objectives are being met will be by assignment grades, "spot-check" quizzes, a midterm test, and a final exam.

Reference Materials: The text for the course is "*Introduction to Solid State Physics*" (8th ed.) by Charles Kittel. We will cover chapters 1 through 9. Another very well written and useful textbook available in the library is *Solid State Physics* by J. S. Blakemore. A more advanced text, covering the same topics at more of a graduate level, is *Solid State Physics* by Ashcroft and Mermin.

The course website contains useful links including the course syllabus, weekly assignment listings, and assignment and test solutions. We will occasionally make use of *Mathematica* in class and in assignments. Please familiarize yourself with this software if you have not already used it in previous courses.

Approximate Schedule (Please see http://www.physics.wwu.edu/from/475.15w/syllabus.html for an up to date schedule!):

Week	Date	Text Chapter	Assignments		Tests
				Due	
1	Jan 7 -9	1	1.1, 1.2, 1.3	Jan 14	
2	Jan 12-16	2	A2	Jan 21	
3	Jan 19-23	2	2.2, 2.3, 2.4	Jan 28	

4	Jan 26-30	3	2.5, 2.6, 2.7	Feb 4	
5	Feb 2-6	4	3.1,2,3,4,5,6	Feb 11	
	Fri. Feb 13				**Midterm**
6	Feb 9-13	5	No assignment this week	-	
7	Feb 16-20	6	4.1, 2	Feb 25	
8	Feb 23-27	7	4.3, 4, 5, 6	Mar 4	
9	Mar2-6	8	5.1, 2	(Don't hand in)	
10	Mar 9-13	9	No assignment	-	
	Wednesday, March 18 10:30-12:30				Final Exam

Homework: There will be a weekly assignment due at 5pm on Wednesdays. Web solutions will go up immediately after that time and therefore late assignments will not be accepted. Feel free to work on homework problems with others but be sure that you are learning the material by doing so. You will not have others to work with during the tests!

Tests: There will be a one-hour midterm test, and a final two-hour cumulative exam. These tests will be open-book/notes.

Quizzes: There will be 7 or 8 "spot-check" quizzes spaced randomly throughout the quarter. These will be open book/notes and will be allotted 10 minutes.

Grades:

7 Quizzes	10%
Assignments	40%
Midterm Test	20%
Final Exam	30%

LETTER GRADE SCALE

Percentage	90-100	85-89	80-84	77-79	73-76	70-72	67-69	63-66	60-62	57-59	53-56	<53
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F