## **Syllabus**

Course: Physics 342/555, Spring 2012 Instructor: Dr. Pengcheng Dai, Room 407A, ext. 4-1509 or 607-8067 (cell), e-mail: pdai@utk.edu Class: MWF. 12:20-13:10 Physics 314, Textbook, Condensed Matter in a Nutshell by Mahan, Office hours: MWF. 1:10-2:00 pm

| Date             | Chapter (Sections)             | Homework problems will be assigned  |
|------------------|--------------------------------|-------------------------------------|
| Ion 11 12 10     | Chantars 2                     | Problems 2, 2, 5, due Ion, 20       |
| Jan. 11, 15, 18  | Chapters 2                     | Problems 2, 5, 5, due Jan. 20       |
| 1 00 02 05 07    | Crystal Structures             |                                     |
| Jan. 20,23,25,27 | Chapters 3                     | Home work problems due Feb. 3, 2012 |
|                  | Energy Bands                   |                                     |
| Jan. 30, Feb1, 3 | Chapters 4                     |                                     |
|                  | Insulators                     |                                     |
| Feb. 6,8,10      | Chapter 5                      |                                     |
|                  | Free electron metals           |                                     |
| Feb. 13,15,17    | 1 <sup>st</sup> exam, Feb. 13, |                                     |
|                  | Chapter 6                      |                                     |
|                  | Electron-electron interactions |                                     |
| Feb. 20,22       | Chapter 6                      |                                     |
|                  | Electron-electron interactions |                                     |
| Feb. 24, 27,29,  | Chapter 7                      |                                     |
| March 2          | Phonons                        |                                     |
| March 5, 7, 9,12 | Chapter 8                      |                                     |
|                  | Boson systems                  |                                     |
| March. 14, 16,   | Chapter 9                      |                                     |
| 26,28,           | Electron-phonon interactions   |                                     |
| March 30         | $2^{nd}$ exam                  |                                     |
| April 2,4,6      | Chapter 10                     |                                     |
|                  | Extrinsic semiconductors       |                                     |
| April 9, 11, 13  | Chapter 11                     |                                     |
|                  | Transport phenomena            |                                     |
| April 16, 18. 20 | Chapter 12                     |                                     |
|                  | Optical properties             |                                     |
| April 23,25,27   | Chapter 13                     |                                     |
|                  | Magnetism                      |                                     |
|                  |                                |                                     |
| May ?            | Final exam                     | To be announced                     |

Class attendance is expected. You are responsible for the material that will be covered in class and for all the homework problems assigned each week. The homework will be assigned on the web. The assigned homework will be graded each week. The home work needs to be done independently. There will be occasional in-class homework, where I will present a problem and ask you to help solving the problem. You can discuss with your

peers and you should hand over your solutions to me after the class. The purpose of this excise is to make sure that you understand the concept of the lecture, and you are present in the class room. We will also take attendance for each class, and the final attendance will be recorded and counted for the final grade.

You will have at least one week of time to do the homework. Study by consulting first your class notes and then finding the appropriate material in your textbook. Study carefully the problems that are worked out in your textbook.

There will be three closed book exams; the first two will contribute 20% each. The final exam will be <u>comprehensive</u> and it will carry 35% of the total weight. There will be no makeup exams.

The home work assigned each week including occasional in-class problem will take 15% of the total weight in the final grade. Attendance will take 10% of the total weight in the final grade.

## A <u>CALCULATOR</u> is required.

Talking or disturbing the class in any other way will not be tolerated. However, you are strongly encouraged to ask questions during the class. There are no bad questions, and asking questions can stimulate discussion and can improve the environment of the class.

Come and talk to me about any concerns you might have regarding this course.

For each exam, you will be allowed to bring your textbook but nothing else. You can use your calculator, but no other materials are allowed in the exams.

Additional reference books: Elementary solid state physics by M. Ali Omar, Addison Wesley Longman press, and introduction to solid state physics by Charles Kittel, 7<sup>th</sup> edition.