Information for Solid State Theory FYST25/FFF051

Spring 2010

1 Aim of the course

The course shall provide a better understanding of central concepts in solid state physics and their relation to the basic theories of quantum mechanics and electrodynamics. The students shall learn how these concepts can be applied to model physical effects quantitatively. Particular emphasis is given towards topics relevant to ongoing research in solid state physics and nanoscience in Lund.

2 General Information

Please consult regularly the home page `http://www.teorfys.lu.se/FYS234/` where all sort of updated information as well as the exercises and lecture notes can be found.

3 Schedule

Lectures mixed with exercises: weeks 3-9 2010: Tuesday 8-10 H421, Wednesday 15-17 H221, Thursday 8-10 H221.

Guided study group: Monday, time to be decided, K457 (Seminarierum F)

Oral exams: probably week 10. You will register for slots during the course and the list of slots will be shown on the course home page afterwards (in case you forgot your time).

4 Requirements for Participants

Written part: Handing in the homework problems in groups of two or three. It is required that substantial work is done on 80% of the problems (i.e. the solution need not to be necessarily correct). I strongly prefer a wrong solution where the students dealt with the matter to one copied from textbooks or fellow students. Please keep the deadlines!

Oral part: Individual oral exam at the end of the course. Here the student will receive a randomly chosen sheet with 4 exercise problems (essentially all exercises from the weekly sheets are contained) and shall demonstrate that he/she can apply the material discussed during the course to solve the exercise problems. It is suggested to bring and use a compilation of important issues/formulas written by oneself (less than 4 pages). Note that strong weight is given to the physics around the respective problem.

5 Furthermore you are supposed to

- form groups of two or three students within the first week and meet regularly (twice a week?) to discuss the lectures and exercises. (You may switch groups later if needed.)
- attend the lectures/exercises (which is however not mandatory) and contribute with questions and suggestions.
- follow the reading assignments and work out *all* exercises at home.

6 Grading

The grading will be only based on the oral exams after the lectures and exercises are finished. The grade is based on your performance *after* you learned the topics during the seven weeks of teaching. Thus I strongly encourage all types of questions as well as ideas for alternative interpretations, so that we can work on them together during the course. Don't be afraid to disclose a lack of understanding. The topics are difficult and misunderstandings are common. They can only be resolved if they surface the light of the classroom!

7 Literature

You are supposed to work both with the *Compendium* (see the course web page) and a *textbook* in order to get a more thorough picture. On a basic level the books by

C. Kittel: Introduction to Solid State Physics (John Wiley & Sons 1996)

a traditional text with excellent explanations, or

H. Ibach and H. Lüth: Solid State Physics (Springer 2003)

which has a good overlap with the course structure, may be used. On a higher (and more theoretical) level I recommend

David W. Snoke: Solid State Physics (Addison Wesley 2008)

which is a modern advanced text and particularly useful for the topics in the second half of the course.

Reading instructions will be given for these three books.

8 Teachers

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