



The Hebrew University of Jerusalem

Syllabus

Solid State Physics - 77602

Last update 20-08-2019

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Physics

Academic year: 0

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Dr. Zohar Ringel

Coordinator Email: zohar.ringel@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Dr. Zohar Ringel
Mr. Hen Alpern

Course/Module description:

The course will cover basic and advanced topics in Solid State Physics

Course/Module aims:

The students will be familiar with basic concepts in solid state physics: Crystal structure, Quasi-crystals, Electronic band structures, Metals, Insulators, the Quantum Hall Effect, Anderson Localization in low dimensions, and Magnetic phenomena.

Learning outcomes - On successful completion of this module, students should be able to:

The students will be familiar with basic concepts in solid state physics: Crystal structure, Quasi-crystals, Electronic band structures, Metals, Insulators, the Quantum Hall Effect, Anderson Localization, and Magnetic phenomena such as paramagnets, ferromagnets, and spin-liquids

Attendance requirements(%):

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Teaching arrangement and method of instruction: Frontal lectures, TA hour, weekly exercise.

Course/Module Content:

1. Background
2. Crystal structure: Periodic structure, Bravais Lattice, reciprocal lattice.
3. X ray diffraction.
4. Quasicrystals.
5. Electronic band structure: Bloch theorem; The nearly free electron approximation, energy bands.
6. Electronic band structure: Tight binding approximation.
7. Conductance.
8. Graphene.
9. The Quantum Hall Effect
10. Transport in disorder quantum wires.
11. Super-exchange interactions
12. Magnetic phenomena.

Required Reading:

The course will be based on the following text books:

1. Kittel
2. Ashcroft & Mermin
3. *Topological Insulators and Topological Superconductors*
B. Andrei Bernevig with Taylor L. Hughes

Additional Reading Material:

Will be given during the course

Course/Module evaluation:

End of year written/oral examination 80 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 10 %

Reports 0 %

Research project 0 %

Quizzes 10 %

Other 0 %

Additional information:

None