האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

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