האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

THE PHYSICS OF SEMICONDUCTOR DEVICES - 83882

Last update 14-10-2024

HU Credits: 5

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Applied Physics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Prof Uriel Levy

Coordinator Email: ulevy@mail.huji.ac.il

Coordinator Office Hours: Coordinate in advance

Teaching Staff:

Prof. Uriel Levy,
Mr. Yonatan Uziel

Course/Module description:

Fundamentals of crystal structure, refining processes of material and crystal growth, Semiconductor intrinsic and extrinsic, electrons and free holes - charge carriers majority and minority, regeneration processes - recombination, mobility, diffusion, life time and diffusion distance of free charge carriers, equation of flow and continuity, energy bands model, density of modes , probabilities of Entry, effective mass, semiconductor intrinsic and extrinsic at equilibrium, diode junction and the principle of operation, typical current voltage of diode junction, Schottky diode, metal contacts - semiconductor switching diode, diode hacking mechanism , field effect transistor, working principle and characteristic .

Course/Module aims:

- *Introduction*
- *Classification of solids and crystals.*
- *Equilibrium properties of semiconductors.*
- *Carriers' transport in semiconductors.*
- *Scattering mechanisms and carriers' mobility.*
- *Nonequilibrium excess carriers in semiconductors.*
- *Experimental techniques for semiconductors' characterization.*
- *Introduction to quantum theory of solids.*
- *Semiconductors' statistics and energy band theory.*
- *PN junction*
- *Transistors*

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

Learn basic physical principles of semiconductors

Learn semiconductor components

Attendance requirements(%):

None

Teaching arrangement and method of instruction: Lecture + Tutorial

Course/Module Content:

See course descripition

Required Reading:
NONE

Additional Reading Material:
- *A.Bar-Lev, "Physics of Semiconductor and Semiconductor Devices".*
- *D.Neamen, "Semiconductor Physics and Devices. Basic Principles".*

Grading Scheme:
Written / Oral / Practical Exam 80 %
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 20 %

Additional information:
To take the Final Exam you need to submit at least 80% of the Home Works