Course syllabus

Elektroniska material
Electronic Materials

FFFF01, 7,5 credits, G2 (First Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED N
Date of Decision: 2023-04-17

General Information

Main field: Technology.
Compulsory for: N2
Language of instruction: The course will be given in Swedish

Aim

The physics of the solid state, in particular the electrical properties of solids, will be studied in the first part of the course. It is based on the quantum mechanics as covered in e.g. the course Quantum Phenomena and Nanotechnology. In the second part it discusses electronic devices such as the pn-junction and also briefly transistors. In this way the course directly connects to the applications as treated in the following course on Electromagnetics and Electronics. The course also briefly considers optical and dielectric properties of matter.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to account for and explain, using simple models, the properties of solid materials, in particular those of relevance to electronic applications
- be able to account for the operation of simple electronic devices.

Competences and skills
For a passing grade the student must

- be able to understand the assumptions on which the models used in the course are based, their applicability and limitations.

- be able to carry out and evaluate experiments as well as to write laboratory reports.

Contents

Particle and wave properties of the electron, binding in crystals. Electronic structure: free-electron model and bandstructure. Electrical conductivity; metals, semiconductors, and insulators. Semiconductor devices: pn-junction and introduction to bipolar and field-effect transistors. Brief review of optical and dielectric properties of matter.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written examination and completed laboratory work.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts
Code: 0115. **Name:** Laboratory Projects.
Credits: 1. **Grading scale:** UG. **Assessment:** Presentation, in writing and orally, of laboratory exercises and the results.
Code: 0215. **Name:** Electronic Materials.
Credits: 6,5. **Grading scale:** TH. **Assessment:** Written examination.

Admission

Assumed prior knowledge: FAFA10 Quantum Phenomena and Nanotechnology.
The number of participants is limited to: No
The course overlaps following course/s: FFF100, FFFF05

Reading list

- Printed lecture notes by Günter Grossmann. Additional hand-out material and laboratory instructions.

Contact and other information

Course coordinator: Martin Leijnse, martin.leijnse@ftf.lth.se
Course homepage: http://www.ftf.lth.se/courses/ffff01
Further information: Compulsory laboratory exercises. Some elements may be taught and assessed in English. This includes a maximum of 1.5 hp, in the form of laboratory sessions or written assignments.