Condensed Matter Physics

Module No.: MN-P-SP-CondMat, MN-P-PN-CondMat, MN-P-WaMa
Version: 04.02.2014 RW

Course: Semiconductor Physics and Nanoscience

Lecturers: Roger Wördenweber
Email: r.woerdenweber@fz-juelich.de

Requirements for participation:
Basic knowledge of condensed matter physics

Type of module examinations:
One oral examination at the end of the module

Duration of the course:
1 semester

Aims of the course:
Understanding of theoretical and experimental concepts of semiconductor physics, nanotechnology as well as aspects of future information technology.
Knowledge of basic fields and important applications of information technology.

Contents of the course:
Semiconducting materials and nanostructures represent the backbone of modern electronics and information technology. At the same time they are fundamental to the research of problems of modern solid state physics, information technology, and biophysics. This lecture will provide an introduction to semiconductor physics and its applications.

Topics covered are
- introduction to semiconductor physics, crystalline structure, band structure, electronic and optical properties,
- heterostructures, junctions and interfaces,
- basic semiconductor device concepts,
- up-to-date techniques and strategies of information technology ranging from nowadays preparation technologies and nanoscience to concepts of molecular electronics and bioelectronics.

Recommended literature:
Skriptum (available during the course)
Bergmann/Schäfer: Experimentalphysik (Band 6: Festkörper)
Ibach/Lüth: Solid-State Physics. An Introduction to Principles of Materials Science
S.M. Lindsay: Introduction to Nanoscience (Oxford University Press, ISBN 9780199544219)