

FYS3410 - Vår 2011 (Kondenserte fasers fysikk)

<http://www.uio.no/studier/emner/matnat/fys/FYS3410/index-eng.xml>

Based on Introduction to Solid State Physics by Kittel

Course content

- **Periodic structures, understanding of diffraction experiment and reciprocal lattice**
- **Crystal binding, elastic strain and waves**
- **Imperfections in crystals: point defects and diffusion**
- **Crystal vibrations: phonon heat capacity and thermal conductivity**
- **Free electron Fermi gas: density of states, Fermi level, and electrical conductivity**
- **Electrons in periodic potential: energy bands theory, classification of metals, semiconductors and insulators**
- **Semiconductors: band gap, effective masses, charge carrier distributions, doping, pn-junctions**
- **Metals: Fermi surfaces, temperature dependence of electrical conductivity**

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FYS3410 lecture schedule and exams: Spring 2011

W/19/1/2011:	Introduction and motivation. Periodicity and lattices	1h
M/24/1/2011:	Index system for crystal planes. Crystal structures	2h
W/26/1/2011:	Reciprocal space, Laue condition and Ewald construction	1h
M/31/1/2011:	Brillouin Zones. Interpretation of a diffraction experiment	2h
W/02/2/2011:	Crystal binding, elastic strain and waves	1h
M/07/2/2011:	Elastic waves in cubic crystals; defects in crystals	2h
W/09/2/2011:	Defects in crystals; case study – vacancies; diffusion	2h
M/14/2/2011:	Crystal vibrations and phonons	2h
W/16/2/2011:	Lattice heat capacity: Dulong-Petit and Einstein models	2h
M/21/2/2011:	Phonon density of states (DOS) and Debye model	2h
W/23/2/2011:	General result for DOS; role of anharmonic interactions	2h
M/28/2/2011:	Thermal conductivity and repetition of crystal vibrations	2h
W/02/3/2011:	no lectures	
M/07/3/2011:	no lectures	
W/09/3/2011:	no lectures	
M/14/3/2011:	Free electron Fermi gas in 1D and 3D – ground state	2h
W/17/3/2011:	Density of states, effect of temperature – FD distribution	1h
M/21/3/2011:	Heat capacity of FEFG	2h
W/23/3/2011:	Repetition	2h
M/28/3/2011:	Mid-term exam	

M/04/4/2011:	Electrical and thermal conductivity in metals	2h
W/06/4/2011:	Bragg reflection of electron waves at the boundary of BZ	2h
M/11/4/2011:	Energy bands, Kronig - Penny model	2h
W/13/4/2011:	Empty lattice approximation; number of orbitals in a band	2h
Påsk		
W/27/4/2011:	Repetition of electrons in periodic potential	2h
M/02/5/2011:	no lectures	
W/04/5/2011:	no lectures	
M/09/5/2010:	Semiconductors, effective mass method, intrinsic carriers	2h
W/11/4/2010:	Impurity states in semiconductors and carrier statistics	2h
M/16/5/2010:	p-n junctions, Schottky contacts and heterojunctions	2h
W/18/5/2010:	Metals and Fermi surfaces	2h
M/23/5/2010:	Repetition	2h
26-27/5/2010:	Final Exam (Jonatan Slotte, Aalto University, Helsinki)	