

Lecture Hours: Tuesday and Thursday: 3:30 PM – 4:45 PM
Room 116 Sharp Laboratory

Professor: Henry R. Glyde
Rm 229 Sharp Lab
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Texts: Solid State Physics
N. Ashcroft and N. D. Mermin
(Holt, Rinehart and Winston, New York, 1976) ISBN 0 -03-083993

Condensed Matter Physics in a Nutshell
G. D. Mahan
(Princeton University Press, New Jersey, 2011) ISBN 978-0-691-14016-2

TOPICS: This is a second course in Condensed Matter Physics. It follows PHYS 624: Introduction to Condensed Matter Physics. The topics build on simple models of single electrons and phonons in solids. The topics include:

- Classification of solids, types of solids
- Electronic distributions in and cohesive energy of solids
- Adiabatic Approximation,
- Review Electrons, Band structure and Berry Phase
- Beyond the One Electron Approximation
 - Hartree and Hartree-Fock Theory
 - Density Functional Theory
 - Screening
- Phonons, Quantum Theory, Thermal properties
- Scattering of Particles by Crystals,
- Linear Response Theory
- Magnetism
 - Single electrons in a magnetic field
 - Localized Magnetic Moments and Kondo Impurities
 - Magnetic ordering in crystals
- Optical properties (of metals)
- Bose-Einstein Condensation and Superfluidity (as time permits)
- Superconductivity (as time permits).

First Lecture: February 11, 2014, Last drop/add day: February 24, 2014.

MARKING SCHEME: Quizzes (2) – 1.0 Hour, Final – 2.0 Hours
Problems – 20 %, Quizzes – 40-50 %, Final- 30- 40 %