Solid State physics part I and II

Lecturer: Marek Godlewski, godlew@ifpan.edu.pl

Lectures: Tuesday 9:00 – 12:00
First lecture: October 6, 2026
Place: Room A, Institute of Physics

Topics covered by the lectures:

Part I – 1st semester

1. Introduction to quantum mechanics and solid state physics

2. Crystals - ionic, covalent and van der Waals bonds

3. Electrons in crystals, effective mass

4. Density of states

5. Energy bands

6. Fermi-Dirac statistics, Fermi level

7. Dopants in crystals

8. Physics of p-n junction

9. Lattice vibrations

Part II – 2nd semester

1. Boltzmann kinetic equation – scattering processes

2. Electron in crystal – effect of an electric field

3. Electron in crystal – effect of an electric and magnetic field

4. Hall effect

5. Electron in magnetic field – quantum model

6. High frequency e-m field – interaction with electrons

7. Metallic reflection

8. Plasma frequency

9. Spectroscopy

10. Lasers – Einstein equations

11. Radiative and nonradiative recombination processes

12. Free and bound excitons

Bibliography:

Kittel Solid State Physics