| | |
|---|---|
| **Course Title:** Solid State Physics | **Number of Units:** 1 |
| **SSD :** FIS/03 | **CFU:** 6 |
| **Course aims:** fundamental aspects of solid state physics. Phenomenological and microscopic description of metals and semiconductors. Transport, thermodynamic and dielectric properties of solids. | |
| **Course Description:**<br>Single particle electronic states in one-dimensional double and multiple quantum wells; Kroenig-Penney model; Bloch theorem in one dimension; Nearly free electron.<br>Bravais Lattices in different dimensions; Reciprocal lattices and Brillouin zone; Bloch theorem in any dimension; Tight-binding method for electronic band structures; Electronic states of Graphene.<br>One band model for metal; Two-band model for semiconductors; Thermodynamic properties of metals and intrinsic semiconductors. Hartree and Hartree-Fock approximation; Jellium model.<br>Dielectric constant; Screening effects in metals; Dielectric properties of semiconductors; Impurities in metals and semiconductors; Chemical potential of extrinsic semicondutors. Vibrational degrees of freedom; Harmonic approximation for solids; Classical normal modes; Phonons; Thermodynamic properties due to phonons. Transport properties. Drude model for metals and semiconductors; Semiclassical dynamics and Boltzmann equation. | |
| **Assumed Background:** elements of thermodynamics and electromagnetism; Modern physics | |
| **Assessment methods:** oral exam | |