TOPICS OF THE LECTURES OF CONDENSED MATTER PHYSICS

[AM X = Ashcroft Mermin Chapter X, LL X Y Z = Landau Lifshits vol X chap Y sec Z]

L1	25 sep 2018	Introduction. Crystal lattices. Bravais Lattices and their classification. Primitive cell. Wigner-Seitz primitive cell. [AM 4, see also AM 7].
L2	27 sep 2018	Reciprocal lattice and its properties. Examples. Lattice planes. [AM 5].
L3	2 oct 2018	X-ray scattering from a crystal: Bragg's and von Laue's formulations and their equivalence. [AM 6].
L4	4 oct 2018	Exercises on lattices and X-ray diffraction. [AM: problem 1 page 82; problem 1 page 108].
L5	9 oct 2018	Exercises on lattices and X-ray diffraction. [AM: problem 1 page 108, continued].
L6	11 oct 2018	The adiabatic approximation. The harmonic approximation for lattice vibration. Normal modes of a one-dimensional Bravais lattice. [AM 22].
L7	16 oct 2018	Normal modes of a one-dimensional Bravais lattice with basis [AM 22]. General formulation of the theory of harmonic lattice vibrations. [AM 22: see also LL V VI 69].
L8	18 oct 2018	Acoustic and optical modes. The quantum theory of the harmonic crystal. Phonons. [AM 23].
L9	23 oct 2018	The specific heat of solids. Debye theory of the specific heath. Debye's interpolating formula. [AM 23].
L10	25 oct 2018	The specific heat of solids. Einstein theory. Specific heath of optical modes. [AM 23]. Exercise on the linear chain with non-nearest-neighbors springs. [AM; problem 1, page 448].
L11	5 nov 2018	Exercise on the transverse phonons in CuO_2 planes. [Cazaux, problem 8, page 271].
L12	6 nov 2018	Exercise on the lattice specific heat. [AM: problem 2, page 468]. Electron states in a periodic potential. Bloch's theorem. [AM 8].
L13	8 nov 2018	Periodic boundary conditions. Second proof of Bloch's theorem [AM 8]. Exercise on the lattice specific heat [Cazaux, problem 18, page 230]. + 1 h question time, in replacement of the lectures lost for the suspension of the activities on October 29th and 30th.
L14	12 nov 2018	Properties of Bloch electrons. Group velocity [AM 8]. Exercise on the lattice specific heat [Cazaux, problem 18, page 230 - continued].
L15	13 nov 2018	Exercise on acoustic and optical phonons. Exercise on the lattice specific heat [Cazaux, problem 11, page 215].
L16	15 nov 2018	Exercises on crystal structures, X-ray scattering, and lattice specific heat. + 1 h question time, in replacement of the lectures lost for the suspension of the activities on October 29th and 30th.
L17	19 nov 2018	First mid-term assessment test.
L18	20 nov 2018	The Fermi surface. Density of states of Bloch electrons.

	Thermodynamic properties of Bloch electrons. Sommerfeld expansion. [AM 8, see also AM 2].
L19 22 nov 2018	Chemical potential and specific heat of Bloch electrons. Electrons in a weak periodic potential [AM 9]. + 1 h question time, in replacement of the lectures lost for the suspension of the activities on October 29th and 30th.
L20 26 nov 2018	The tight-binding method to calculate the electron bands in solids [AM 10].
L21 27 nov 2018	Examples of applications of the tight-binding method.
L22 29 nov 2018	Exercises on the tight-binding method. + 1 h question time, in replacement of the lectures lost for the suspension of the activities on October 29th and 30th.
L23 4 dec 2018	The semiclassical model of Bloch electron dynamics. Motion in a uniform electric field. Motion in a uniform magnetic field. Closed and open orbits. [AM 12].
L24 6 dec 2018	The semiclassical theory of transport phenomena in metals. The Boltzmann equation. Electrical conductivity [AM 13].
L25 11 dec 2018	Exercises on the tight-binding method. The tight-binding model for polyacetylene.
L26 13 dec 2018	Homogeneous semiconductors [AM 28].
L27 18 dec 2018	Exercises on semiconductors [Cazaux, exercise 10, page 506; exercise 13, page 520]. The electrical conductivity of semiconductors.
L28 20 dec 2018	Doped semiconductors. Predominantly extrinsic regime.
L29 8 jan 2019	Exercises on semiconductors.
L30 10 jan 2019	Exercises on semiconductors.
L31 15 jan 2019	Inhomogeneous semiconductors [AM 29].
L32 17 jan 2019	Second mid-term assessment test.