ESG 281: Engineering Introduction to the Solid State (fall semester, 2022)

Textbook: 1. Modern Physics for Scientists and Engineers, 2nd ed. (2017) by J. R. Taylor and C. D. Zafirators

2. Fundamentals of Solid State Engineering, 3rd ed. (2009) by Manijeh Razeghi

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Office hours: 12-2 PM on Tuesday and Thursday or any time upon request

Week	Date	Topics
1	2020/8/30	Quantum physics (Blackbody radiation, Planck hypo., Rutherford exp)
	2022/9/01	Quantum physics (Heisenberg uncertainty, Schrödinger eq, Particles in box)
2	2022/9/06	Quantum physics (harmonic oscillation)
	2022/9/08	Quantum physics (quantum mech. harmonic oscillation)
3	2022/9/13	Quantum physics (Rigid rotor, angular momentum)
	2022/9/15	Quantum physics (angular momentum, precession)
4	2022/9/20	Quantum chemistry (atomic electronic structure, hydrogen, multi-electron atoms)
	2022/9/22	Quantum chemistry (electronic structure of molecules, chemical bonds)
5	2022/9/27	Quantum chemistry (electronic structure of molecules, chemical bonds)
	2022/9/29	Quantum chemistry (interaction of molecules with light)
6	2022/10/06	Quantum chemistry (electronic spectroscopy)
7	2022/10/11	Quantum chemistry (molecular spectroscopy)
	2022/10/13	Classification of solids (covalent, molecular, ionic crystals, mixed ionic and covalent)
8	2022/10/18	Crystal binding (van der Waal interaction, cohesive energy, Madelung energy)
	2022/10/20	Crystal structure (crystal lattice, the reciprocal lattice, Brillouin zone)
9	2022/10/25	Surface science 1
	2022/10/27	Surface science 2
10	2022/11/01	Surface energy 1
	2022/11/03	Surface energy 2
11	2022/11/08	Nano material preparation 1
	2022/11/10	Nano material preparation 2
12	2022/11/15	Thermal properties of solids 1 (lattice heat capacity, density of modes)
	2022/11/17	Thermal properties of solids 2I (thermal expansion, thermal conductivity)
13	2022/11/22	Energy bands in solid 1 (free electron model, number of orbitals in band)
	2022/11/24	Energy bands in solid 2 (Fermi surfaces, experimental methods)
14	2022/11/29	Semiconductor crystals (band gap, intrinsic carrier concentration)
	2022/12/01	Energy applications of semiconductors 1
15	2022/12/06	Energy applications of semiconductors 2

Midterm exams I & II Final exam: Follow the University schedule