MSN 501 Spring 2018

Atomic Structure, Mechanical and Thermal Properties of Materials

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Lectures: Monday 8:40-10:30 Wednesday 10:40-12:30 (SU-01),

TA: Bartu Simsek

Grading:
25% 1st Midterm (6th week)
25% 2nd midterm (12th week)
30% Final (TBA)
20% Homework (Quiz) + Project

Textbook: Solid State Physics (Ashcroft/Mermin)
Introduction to Solid State (Kittel)

Syllabus:

Week	Subject	
1	Symmetry Description of Solids	Unitcell, crystal structures, group theory
2	The Reciprocal Lattice and XRD	Diffraction, Brillouin Zone, Fourier Analysis
3	Cohesion of Solids I	Crystal binding, types of bonding
4	Cohesion of Solids II	…
5	Phonons: Crystal Vibrations	Vibrations(monoatomic, diatomic), quantization, crystal momentum
6	Phonons: Thermal Properties	Heat capacity, thermal expansion, conductivity
7	Electronic structure	Free electron gas, Fermi-dirac Distribution, DOS
8	Electronic structure	Bloch functions, Kronig-Penney model, periodic potential
9	Band Theory	Tight Binding, Hartree-Fock, DFT
10	Band Theory	…
11	Magnetism	Quantum theory of para-, dia-magnetism
12	Magnetism	Quantum theory of ferro-, antiferro-magnetism, spin waves, magnetic resonance
13	Optical Properties	Polarization, dielectric response, transitions
14	Optical Properties	Excitons