Quantum Theory of Matter with an emphasis on Solid State Physics

Syllabus:

1. Introduction to basic concepts of quantum mechanics, wavefunctions, operators, propalistic interpretation.
2. Solution of the Schroedinger equation for one-dimensional potentials.
3. Quantum harmonic oscillator, creation-annihilation operator.
4. Central potentials, angular momentum, hydrogen atom.
5. Spin, addition of angular momenta.
6. Time-independent perturbation theory, variational method.
7. Types of chemical bonding in solids.
8. Bravais lattices, reciprocal space.
9. Bloch theorem, k.p method, effective mass.
10. Density of states, total energy.
11. Phonons.