Code	Subject Title	Cr. Hrs	Semester
PHY-419	**SOLID STATE PHYSICS-I**	**3**	**VII**
Year	Discipline		
4	**Physics**		

Course Outlines:

Introduction: The solid state problem, the Born-Oppenheimer approximation.

The One-Electron Approximation: Free electron gas model (FEG), applications of FEG, failure of FEG.

Effect of Non-Uniform Crystal Potential: The Bloch wave, the reciprocal lattice, the nearly free electron model (NFE) in one-dimension, the concept of energy band structure, the Fermi surface, Fermi velocity in NFE, The Bloch electron, the concept of effective mass.

Methods of Calculating Energy Band Structures: The LCAO method, the APW method, the OPW method, the concept of pseudopotentials,

Electron Interactions: The self-consistent calculations, the Hartree-Fock equation, plane-wave solution of the HF equation, problems.

Books Recommended:

1. *SolidState Physics* byAshcroft &Mermin, (1976).
2. *Introduction to SolidState Physics,* 7thEddition,by C. Kittle, (1996).
3. *Elementary SolidState Physics* by M. A. Omar, (1975).
4. *Quantum Theory of the SolidState*byj. Callaway, (1991).
5. *Principles of the Theory of Solids* byJ. M. Ziman, (1969).