

<b>Course Title</b>	<b>SOLID STATE PHYSICS-II</b>
<b>Course Code</b>	<b>MPHY-342</b>
<b>Credit Hours</b>	<b>CH3</b>
<b>Pre- requisites</b>	<b>MPHY-341</b>
<b>Learning outcomes</b>	To equip students with fundamental concepts of solid-state physics.
<b>Contents</b>	<p><b>Free electron Fermi gas:</b> Concept of crystal potential, energy levels in one dimension, effect of temperature on the Fermi-Dirac distribution, free electron gas in three dimensions, electrical conductivity and Ohm's law, the thermal and electrical conductivities of metals and their ratio, the motion of free electrons in magnetic fields, Hall effect,</p> <p><b>Energy bands:</b> nearly free electron model, the origin of the energy gap, magnitude of the energy gap, Bloch functions, wave equation of an electron in a periodic potential, crystal momentum of an electron, solution of the central equation, empty lattice approximation, approximate solution near a zone boundary, number of orbitals in a band, metals and insulators, Tight binding method, Wigner Seitz method, pseudopotential method.</p> <p><b>Semiconductor crystals:</b> band gap, equation of motion, effective mass, physical interpretation of the effective mass, effective masses in semiconductors, silicon and germanium, intrinsic carrier concentration, intrinsic mobility, impurity conductivity, donor states, acceptor states.</p>
<b>Teaching-learning Strategies</b>	Classroom teaching / Lecturing
<b>Assignments- Types and Number</b>	Problem sheet: 3-4
<b>Assessment and Examinations</b>	<p>Mid-Term Assessment: 35%</p> <p>Formative Assessment: (25%): It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.</p> <p>Final Term Assessment: 40%</p>
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Introduction to Solid State Physics by C. Kittel (8<sup>th</sup> Edition), Wiley (2012).</li> <li>2. Solid State Physics by N. W. Ashcroft and D. Mermin, CBS Publishing (1987).</li> <li>3. Solid State Physics by J. S. Blakemore, Cambridge (1991).</li> <li>4. Solid State Physics by M. A. Wahab, Narosa Publishing House (1999).</li> <li>5. Physics of Solids, by J. B. Ketterson, Oxford, (2016).</li> <li>6. Elementary Solid State Physics by M. A. Omar, Pearson (2000).</li> <li>7. Solid State Physics by S.O. Pillai, New Age International, (2006).</li> </ol>