Module code	SP-2306			
Module Title	Condensed Matter Physics			
Degree/Diploma	Bachelor of Science (Applied Physics)			
Type of Module	Major Option			
Modular Credits	4	**Total student Workload**	8	hours/week
		Contact hours	4	hours/week
Prerequisite	None			
Anti-requisite	SP-2206 Condensed Matter Physics			

Aims

To provide fundamental studies of the properties of crystalline and non- crystalline materials at the microscopic level. The overall aims are: to relate these studies to the applications of materials in microelectronic, optoelectronic, and other industries, and to provide a sound foundation for research and innovation in the field of condensed matter.

Learning Outcomes

On successful completion of this module, a student will be expected to be able to:

Lower order :	30%	- Identify crystal structures of solids, and explain electronic band structures. - Understand the theory on free electron model and models of heat capacity in solids.
Middle order :	60%	- analyse X-ray diffraction patterns - analyse the electron energy distribution in solids using the Fermi – Dirac function - apply the principles of semiconductors to solid state devices
Higher order:	10%	- evaluate the outcome of the analyses - work in a group to relate theory with application, and communicate individually in the form of presentation or report

Module Contents

- Crystal structures, bonding in solids, crystal diffraction
- Crystal dynamics, lattice heat capacity, concept of phonon, thermal conduction
- Free electron model, quantum theory of metals, Fermi distribution, electron transport
- Electron band structure, semiconductors, origin of band gap
- Solid state devices, p-n junction, transistors, diode, solar cells, etc.

Assessment	Formative assessment	Weekly Tutorial Sessions and Discussion
	Summative assessment	Examination: 60%
		Coursework: 40% - 2 Written Individual Assignments (20%) - 1 Class Test (10%) - 1 Group Presentation (10%)