

Module code	SP-2202		
Module Title	Concepts in Modern Physics		
Degree/Diploma	Bachelor of Science (Applied Physics)		
Type of Module	Major Core		
Modular Credits	4	Total student Workload	8 hours/week
		Contact hours	4 hours/week
Prerequisite	SP-1204 Classical Mechanics or SP-1301 Classical Mechanics		
Anti-requisite	SP-2301 Concepts in Modern Physics		
Aims			
This module aims to introduce students to post-Newtonian concepts in physics that involves theories that were developed in the twentieth century.			
Learning Outcomes			
<i>On successful completion of this module, a student will be expected to be able to:</i>			
Lower order :	30%	- understand the basic principles related to modern physics, which includes relativity, matter waves, energy quantisation, x-ray and also laser generation, and the nuclear structure	
Middle order :	60%	<ul style="list-style-type: none"> - evaluate the effects of special relativity on time and length measurements - explain and apply equations developed to the effects of relativity on momentum and energy - explain and apply the concept of matter wave and wave-particle duality - apply the concept of atomic energy quantization to the electronic structure of atoms - explain the electronic transition process for x-ray generation and atomistic process for laser generation - explain quantized properties of nuclei contents 	
Higher order:	10%	<ul style="list-style-type: none"> - communicate concepts effectively - work independently and also participate as a team member in group discussions and problem solving sessions 	
Module Contents			
<ul style="list-style-type: none"> - Einstein's special theory of relativity. - Lorentz transformation equations to cover mechanics at all speeds, from which a basis for developing effects of relativity on other physical quantities like velocity, momentum, and energy will be established. - Development of the idea of rest energy and a new definition of kinetic energy leading to the development and evaluation of Einstein's mass-energy relationship ($E=mc^2$). - An introduction to the concepts photons, matter waves, and wave-particle duality. - Wave function and the consideration of Schrödinger's equation to represent electron trap. - The concept of quantization of atomic energies and the use of quantum numbers in describing energy states as well as a discussion of the periodic table. - The electronic and atomistic process for x-ray and laser generation. - An exploration of the quantum nature of the nuclear contents and their applications in NMR and MRI. 			
Assessment	Formative assessment	Discussions, tutorials and feedback	
	Summative assessment	<ul style="list-style-type: none"> Examination: 60% Coursework: 40% - 2 tests (20%) - 1 report and 2 assignments (20%) 	