

Faculty	Natural Sciences		
Home Department	Physics and Astronomy		
Module Topic	Quantum and Nuclear Physics		
Generic Module Name	Physics 312		
Alpha-numeric Code	PHY312		
NQF Level	7		
NQF Credit Value	30		
Duration	Semester		
Proposed semester to be offered.	First Semester		
Programmes in which the module will be offered	BSc (Physical Science) (3233, 3120) BSc (Computer Science) (3221, 3023)		
Year level	3		
Main Outcomes	<p>On completion of this module students should be able to:</p> <ul style="list-style-type: none"> • Solve the Schrödinger equation for simple potentials and the Hydrogen atom. • Use the Mathematical structure of quantum mechanics to describe quantum systems. • Calculate properties of nuclei using nuclear models. • Be able to interpret scientific data. • Write scientific reports. • Perform simple nuclear experiments. 		
Main Content	<p>Quantum Physics:</p> <ul style="list-style-type: none"> • Mathematical structure of quantum mechanics: Operators, eigen-states. Schrödinger equation. Free particle, wave packet. One-dimensional problems: infinite square well, harmonic oscillator. Angular Momentum, orbital and spin quantum numbers. Hydrogen atom, quantum numbers and electron clouds. Building of the Periodic Table of elements <p>Nuclear Physics:</p> <ul style="list-style-type: none"> • Bulk nuclear properties, nucleon structure, nuclear structure models, nuclear decay and excitation, nuclear reactions, applied nuclear physics, social impact of nuclear physics, particle physics, unification theories, and structure of Universe. <p>Laboratory component:</p> <ul style="list-style-type: none"> • This component provides students with the practical skills to execute, record and analyse data in especially nuclear and quantum physics experiments. Scientific report writing and presentation skills are developed further. Non-linear least squares, distributions in physics and other elements of data analysis are studied. 		
Pre-requisite modules	PHY212 and PHY222 and MAT211 and MAT221		
Co-requisite modules	None		
Prohibited module Combination	None except from timetable clash groups		
Breakdown of Learning Time	Hours	Time-table Requirement per week	Other teaching modes that does not require time-table
<i>Contact with lecturer / tutor:</i>	56	Lectures p.w.	3
<i>Assignments & tasks:</i>	60	Practicals p.w.	4
<i>Practicals:</i>	56	Tutorials p.w.	1
<i>Assessments</i>	10		
<i>Selfstudy</i>	118		

<i>Other:</i>				
Total Learning Time	300			
Method of Student Assessment	Continuous Assessment (CA): 60% Final Assessment (FA): 40%			
Assessment Module type	Continuous and Final Assessment (CFA)			