The University Of Sheffield.

DEPARTMENT OF PHYSICS AND ASTRONOMY

PHY449	***Further Quantum Mechanics***
Acad Year	***10 Credits***
Staff contact	***Prof David Whittaker - d.m.whittaker@shef.ac.uk***

Outline Description	This module builds on the quantum mechanics learned in the prequisites PHY250 and PHY251. The Heisenberg matrix formulation of the theory is developed from the Schrodinger wave picture. Approximate methods (perturbation theory and variational method) are derived and applied. Methods for solving time dependent problems are developed. Problems involving magnetic fields and spin are treated. Many particle wavefunctions for fermions and bosons are introduced. Some current research literature on Quantum Mechanics is explored through a directed reading exercise.
Restrictions	**Core:** PHYU11, PHYU30 in 2015/16 and PHY2016/17
Prerequisites	PHY250, PHY251
Co requisites	None
Approx Time allocation (hours)	23 Lectures:, 12 Problem Solving; 63 Independent.
Assessment (%)	Written examination -80%, homework -20%
Aims	1. To develop the students' skills and knowledge of quantum mechanics from the position reached at level 2. 2. To apply these skills to solving real problems in physics. 3. To strengthen the students' ability to solve physical and mathematical problems. 4. To obtain critical awareness of current academic research relating to quantum mechanics (commensurate with F7 level).
Outcomes	On successful completion of this module the student should be able to: 1. demonstrate an understanding of the connection between the Schrodinger differential equation formation of quantum mechanics

	and the Heisenberg matrix formulation; 2. use perturbation theory and the variational method to find approximate solutions to problems in quantum mechanics; 3. demonstrate a familiarity with time dependent perturbation theory; demonstrate knowledge of how to solve problems in quantum mechanics involving magnetic fields; 4. use the matrix formulation to describe spin; 5. demonstrate an understanding of how a many-particle wavefunction is affected by the symmetries required for identical bosons and fermions; 6. explain, and evaluate critically, current research results in a topic relating to quantum mechanics.
Recommended Books	"Quantum Physics" by Gasiorowicz “Quantum Mechanics” by Zettilli,
Syllabus	
Academic Notes	