PHYS311
Quantum Mechanics

0.125 EFTS 15 Points
First Semester 21 Feb 2022 – 26 June 2022

Course Coordinator
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General Physics and Astronomy Information
Please consult the document General Information for Physics and Astronomy Students on the Physics and Astronomy Web Page:

Description
This course develops a modern formulation of quantum mechanics from the basic postulates and applies the formalism to a variety of physical systems.

Objectives
The objectives of the course are to understand:

- The way in which systems are represented in quantum mechanics by wavefunctions and physical observables are represented by operators
- How to determine the possible values that can be obtained from the measurement of observables and, given the wavefunction for a state, the probability of obtaining a given value
- How the time-dependent Schrödinger's equation can be used to obtain dynamical information about quantum states and the time-independent equation can be used to determine the allowed energy states given the potential.
- How to apply perturbation theory to obtain approximate solutions to Schrodinger's equation for situations when an exact solution isn't possible
- How the algebra of angular momentum determines the allowed values for the magnitude and one component of the angular momentum and how this can be applied to orbital and spin angular momentum as well as the total angular momentum of a system
- How to use series solutions to solve various differential equations which arise in quantum mechanics

Textbooks
Course Textbook:
David J. Griffiths *Introduction to Quantum Mechanics* Prentice Hall

Recommended/Advanced texts include:
P. A. M. Dirac *The Principles of Quantum Mechanics* Clarendon Press, Oxford
J. J. Sakurai *Modern Quantum Mechanics* Addison-Wesley
Arno Bohm *Quantum Mechanics: Foundations & Applications* Springer-Verlag
J. S. Bell *Speakable and Unspeakable in Quantum Mechanics* Cambridge University Press

Assessment

25% Homework Assignments (5 @ 5%) It is allowed, even encouraged, for you to work together on your assignments. However you must understand the material you hand in. There will be "spot" oral quizzes to test your understanding of what you have submitted in your assignment. You will be given zero for any question you cannot explain properly.

For any student where the examination percentage is higher than the total assignment percentage, the assignments will contribute 0% to the final grade and the Examination will contribute 85%.

15% Mid-semester Test, Thursday 5th May noon (normal lecture/tutorial time)

60% Examination Date tba

The homework assignments will be distributed fortnightly and will due approximately two weeks later.