Faculty of Eng. & Natural Sci.

PHYS303-202001

Quantum Mechanics I

Instructor(s)

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Course Content

The crucial experiments showing the failure of classical physics in explaining the properties of matter and radiation The postulates of quantum mechanics. Wave particle duality and the uncertainty relation.The time dependent and time independent Schrödinger equation. Symmetry and conservation laws. Basic features of the quantum mechanical world explored through one-dimensional problems: the harmonic oscillator, the square well and barrier, free and bound states. Energy quantization. Tunnelling. One dimensional periodic potentials, energy bands and band gaps. Also part of the "core course" pool for the MAT, EL degree program.

Objectives

To learn the development, basic concepts and problem solving approaches of physics

Recommend or Required Reading

Textbook

Griffiths, Introduction to Quantum Mechanics

Assessment Methods and Criteria

	Percentage(%)	Number of assessment methods
Final	40	
Midterm	40	1
Exam		0
Participation	20	

Learning Outcomes

Upon completion of this course, students will be able:
Describe the concept of superposition,
Use this concept to predict outcomes of measurements done on simple quantum systems
Comprehend the concepts of the wave function and of operators
Solve the Schrödinger equation for a range of one-dimensional problems and demonstrate energy quantisation and quantum tunnelling effects
Calculate expectation values and probabilities for simple observables
Solve Schrödinger equation for a range of selected three-dimensional problems such as the hydrogen atom, perform calculations on angular momentum wave functions
Describe how a general initial state will evolve with time

Course Policies

Academic Integrity: Cheating is subject to disciplinary action and a zero grade.
Health reports must be endorsed by the SU Health Center.
Letter grades will be given on an individual basis: there will be no curve based on the class average.