COURSE DETAIL

RELATIVITY AND QUANTUM PHYSICS
Country Singapore
Host Institution Nanyang Technological University
Program(s) Nanyang Technological University
UCEAP Course Level Lower Division
UCEAP Subject Area(s) Physics
UCEAP Course Number 65
UCEAP Course Suffix
UCEAP Official Title RELATIVITY AND QUANTUM PHYSICS
UCEAP Transcript Title RLTVTY/QUANTUM PHYS
UCEAP Quarter Units 4.50
UCEAP Semester Units 3.00

Course Description

This course equips students with the basic concepts and problem solving skills for analyzing objects moving close to the speed of light and particles exhibiting quantum behavior. Students gain physical insights and analytical skills for studying relativistic problems and quantum systems. The course content includes: 1.Foundation (FND): a. Wave properties b. Speed of Light c. Superposition, Diffraction and Interference d. Atoms and subatomic particles 2. Special Relativity (SR) a. Frames of Reference and Galilean Transformation b. Postulates of Special Relativity and Lorentz Transformation c. Length Contraction and Time Dilation d. Minkowski's Space-time diagrams e. Resolving Paradoxes f. Relativistic Momentum, Kinetic Energy and Energy 3. Basic Nuclear Physics (BNP) a. Radioactive particles (b. Nuclear Fission and Fusion c. Radioactivity d. Mass-Energy Equivalence e. Medical application and Dosage 4.Quantum Physics (QP) a. Blackbody Radiation b. Quantization of Physical Quantities c. Photoelectric Effect d. Compton Scattering and wavelength e. Pair Production/Annihilation f. Double Slit Experiment g. Davidsson-Germer Experiment h. Wave-Particle Duality i. Hydrogen Atom (Bohr's Model & Atomic Spectra) 5.Basic Quantum Mechanics (BQM) a. Eigenvalues, Eigenfunctions and Operators b. Two level systems c. Schrodinger's Equation and Wave function d. Probability (Density) e. Infinite and Finite Potential Well (Particle in a Box) f. Quantum Harmonic Oscillator g. Potential Barrier/Step h. Expectation Value and Uncertainty i. Heisenberg's Uncertainty Principle j. Commuting Operators k. Hydrogen Atom l. Quantum Numbers, Degeneracy

Language(s) of Instruction
English

Host Institution Course Number
PH1107,PH1101,CY1307

Host Institution Course Title
RELATIVITY AND QUANTUM PHYSICS

Host Institution Course Details
https://wis.ntu.edu.sg/webexe/owa/AUS_SUBJ_CONT.main_display

Host Institution Campus
Host Institution Faculty
Host Institution Degree
Host Institution Department Physics
Course Last Reviewed 2025-2026

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