	PVKN Govt. College (Autonomous) **Chittoor**	**Program** II B.Sc. Physics Hons.
Course Code **24-PHY-4C11**	**TITLE OF THE COURSE** **INTRODUCTION TO NUCLEAR AND PARTICLE PHYSICS**	**Semester-IV**

Syllabus:

UNIT-I: Introduction to Nuclear Physics:

Nuclear Structure: General Properties of Nuclei, Mass defect, Binding energy; Nuclear forces: Characteristics of nuclear forces- Yukawa's meson theory; Nuclear Models- Liquid drop model- Semi empirical mass formula, nuclear shell model.

UNIT-II: Elementary Particles And Interactions

Discovery and classification of elementary particles, properties of leptons, mesons and baryons; Types of interactions- strong, electromagnetic and weak interactions; Conservation laws –**Lepton Number**, **Baryons number**, Isospin, ~~parity, charge conjugation~~

UNIT-III: Nuclear Reactions and Nuclear Detectors

Nuclear Reactions: Types of reactions, Conservation Laws in nuclear reactions, Reaction energetics, Threshold energy, nuclear cross-section; Nuclear detectors: Geiger- Muller counter, Scintillation counter, Wilson Cloud chamber (Expansion type)

UNIT-IV: Nuclear Decays and Nuclear Accelerators

Nuclear Decays: Gamow's theory of alpha decay, Fermi's theory of Beta-decay, Energy release in Beta decay, selection rules. Nuclear Accelerators: Types- Electrostatic and electrodynamics accelerators; Cyclotron-construction, working and applications; ~~Synchrocyclotron~~ **Betatron construction**, **working and applications.**

UNIT-V: Applications of Nuclear and Particle Physics

Medical Applications: Radiation therapy and imaging techniques, nuclear energy: nuclear reactors and power generation, **Applications of high-energy Particles** ~~high-energy Astro Physics~~