



<b>Phys 4303</b>	<b>NUCLEAR PHYSICS-I</b>	<b>(CR3)</b>
<b>Preq.</b>	<b>Phys 3301</b>	

### Objectives

*To describes the fundamental principles and concepts of Nuclear physics.*

### Syllabus

Basic Properties of Nucleus, nuclear size, mass, radius, binding energy and semi-empirical mass formula, Applications of semi-empirical mass formula, nuclear spin, magnetic dipole moment, electric quadrupole moment, parity, isobaric spin and nuclear statistics, nuclear level, nature of nuclear force between nucleons, the deuteron, Radioactive decay, radioactive decay law, quantum theory of radioactive decay, Basic alpha decay processes, quantum theory of alpha decay and explanation of observed phenomena, angular momentum and parity in alpha decay, alpha decay spectroscopy, measurement of  $\beta$ -ray energies, Fermi theory of  $\beta$ -decay, angular momentum and parity selection rules, neutrino hypothesis, double beta decay, parity violation in beta decay, theory of gamma decay, multipolarity of gamma-rays, angular momentum and parity selection rules, Nuclear forces, Properties of the nuclear force, Nuclear Potential, Yukawa's theory of nuclear forces, Nuclear Models: Liquid drop model, Shell model, collective model.

### Recommended Books

1. *Introductory Nuclear Physics* by K. Krane, Wiley (1980)
2. *Nuclear and Particle Physics* by Burcham, E. E. and Jobes, M., Longman (1995)
3. *Nuclear and Particle Physics* by Martin, R. B., John Wiley (2006)
4. *Nuclear Physics* by I. Kaplan, Addison-Wesley (1980).
5. *Nuclear Physics in a nutshell*, by C.A. Bertulani, Princeton, (2007).
6. *Nuclear Physics* by A. Kamal, Springer, (2014)
7. *Foundations of Nuclear and Particle Physics*, T. W, Donnelly and J. A. Formaggio, Cambridge (2017)
8. *Nuclear Physics: Principles and Applications* by J. Lilley, John Wiley (2013)