



Phys 4304	NUCLEAR PHYSICS-II	(CR3)
Preq.	Phys 4303	

Objectives

This part deals with some additional topics of nuclear physics.

Syllabus

Nuclear Reactions, types of nuclear reactions and conservation laws, Coulomb scattering, nuclear scattering, Q-value of nuclear reaction, threshold energy, transmutation by photons, protons, neutrons and alpha particles, Cross section from nuclear reactions, compound nucleus theory of nuclear reactions, limitations of compound nucleus theory, direct reactions, Neutron Physics, Neutron sources, radioactive sources, photon neutron sources, charged particle sources, reactor as a neutron source, slowing down of neutron, neutron detectors, neutron capture, interference and diffraction with neutrons, Nuclear fission, Description of fission reaction, Mass distribution of fission fragments, Average number of neutrons released, Fission cross section, Chain reaction, Controlled fission reactions, Fission reactors. Nuclear Fusion, Basic fusion processes, Energy released in nuclear fusion, Solar fusion, p-p cycle, CNO cycle, controlled nuclear fusion, D-D and D-T reactions, accelerators, electrostatic accelerators, cyclotrons, synchrotrons, linear accelerators, colliding-beam accelerators.

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)