Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCYD531	Nuclear & Radiation Chemistry	3	0	0	3

Course Objective

- The course is meant to develop a better understanding of nuclear structure, various nuclear reactions and their implication in harvesting of nuclear energy. The course also introduces important information on nuclear reactor, theory involved and reactor design. It also enhance the knowledge of various applications of radiation chemistry and tracers in various fields.

Learning Outcomes

At the end of the course the students should be able to:

- The develop an understanding of the nuclear structure, explain the origin of nuclear reactions
- Differentiate different nuclear energy harvesting technologies, and identify the conditions and parameters for optimum function of nuclear reactor
- Solve problems involving nuclear reactions, reactors, and those related application of nuclear radiations/tracers
- Develop understanding of various application of tracers and nuclear radiation in various fields

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Structure of Nucleus, Shell Model, liquid drop model, Collective model, optical model, merits and demerits. Radioactivity: Decay kinetics, α, β decay, γ emission, Parent –daughter decay –growth relationship, secular and transient equilibrium, Theory of α, β and γ decay, selection rules. Artificial radioactivity.	10L	Develop basic understanding of nuclear radiations Understand decay kinetics Develop understanding on theory of decay
2	Nuclear Reactions: Elastic, inelastic, Photonuclear, radiative capture, evaporation, spallation, Fragmentation, and Transfer reactions. Nuclear fission and fusion; Theory of Nuclear fission, fission energy and fission cross-section, Nuclear Reactors: Classification of reactors, reactor power, critical size, Breeder reactor.	15L	Develop understanding about various type of nuclear reactions Understand fission and fusion Develop understanding on the Nuclear reactor and reactor design
3	Application of radioactivity: Tracers in medicine, agriculture, chemical investigations; Analytical applications, Industry and in age determinations. Neutron Activation Analysis, advantages and applications. Radiation detectors, Radiolysis of water, Dosimeters	17L	Develop knowledge on various applications of radioactivity and tracer techniques Develop understanding on techniques for radiation detection and detectors Understand dosimetry and radiolysis
TOTAL		**42**	

Text Books:

1. Essentials of Nuclear Chemistry H. J. Arnikar, 4th edition, New Age Publishers, 1995.

Reference Books:

1. Nuclear and Radiochemistry, G. Friedlander, J. W. Kennedy, E. S. Macias and J. M. Miller, John Wiley & Sons, 1985.
2. Nuclear and Radiochemistry: Fundamentals and Applications, Karl H. Lieser, 2nd edition, 2001, Wiley, NY.