Course Type	Course Code	Name of Course	L	T	P	Credit
OE	PHO402	INTRODUCTION TO BIOPHYSICS	3	0	0	9

Course Objective
The content of the course introduces the basic concept of biophysics and techniques used to address the biophysical problems to students.
Learning Outcomes
After completion of the course, students will: ● Understand the impact of Physics to solve problems of Biological origin. ● Have insight about numerous theoretical as well as experimental tools to address biological problems at the cellular level.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Basic Concepts**: General organization of a cell and its division; Kinetics and Transport processes; Molecular forces in biological structures; Physics of micro and macromolecules.	6	From this unit, students will learn the basics of biophysics.
2	**Biomolecules:** Biomolecular Structures and Dynamics (Proteins, Nuclear Acids, Carbohydrates, Lipids, and Membranes); Inter and Intra-molecular interactions; Molecular distribution & statistical thermodynamics; Computational biophysics.	16	Here students will learn about details of various structures and dynamics of cellular components.
3	**Optical Techniques**: Spectroscopic; Microscopic; Low and high coherence interferometry; Optical coherence tomography (OCT); Optical/Magnetic tweezers, Laser surgery.	13	From this unit, students will be acquainted about optical techniques used to address biological problems at the cellular level.
4	**Other Techniques**: X-rays and Ultrasound imaging; Magnetic resonance imaging (MRI), Computer tomography (CT), Scanning and Tunneling electron microscopy, Atomic force microscopy.	07	Here students will have knowledge about numerous theoretical as well as experimental non-optical tools used to address biological problems at the cellular level.
	Total	**42**	

Text Books:

1. Essentials of Biophysics, P Narayanan, 2005, New Age International.
2. Biomedical Imaging: Principles and Applications, Ed.: Reiner Salzer, 2012, Wiley.
3. Biophysics: An introduction, Rodney M. J. Cotterill, 2002, Wiley.

Reference Books:

1. Biophysics: An introduction, R. Glaser, 2012, Springer-Verlag Berlin Heidelberg.
2. Biophysics, V. Pattabhi & N. Gautham, 2002, Kluwer Academic Publishers.
3. Molecular and Cellular Biophysics, Meyer B Jackson, 2006, Cambridge
4. Biophysics, Ed. W. Hoppe, 1983, Springer-Verlag.
5. Applied Biophysics, A Molecular Approach for Physical Scientist, T.A Weigh, 2007, Wiley.
6. Introduction to Biomedical imaging, A. G. Webb, 2003, John Wiley & Sons Inc.
7. Magnetic Tweezers for Single-Molecule Experiments, I. D. Vilfan et. al., Ch. 13, pp. 371-395, Handbook of Single-Molecule Biophysics, 2009, Springer.