SRI VENKATESWARA COLLEGE

Biological Science

B.Sc. (HONOURS) BIOLOGICAL SCIENCE

DISCIPLINE SPECIFIC CORE COURSE – 7:

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Physics for Biologists (BS-DSC-301)	**4**	**2**	**0**	**2**	Class XII pass with Biology and chemistry, as one of the papers in Class XII	**NA**

Learning Objectives

The Learning Objectives of this course are as follows:

- To introduce the students to the basic concepts of physics and their applications in biology.
- To empower the students to develop a basic understanding about the principles and concepts of Physics
- To enable the students to develop quantitative approaches to solve physical/biological problems
- Provide a better understanding of various biophysical processes

Learning outcomes

On successful completion of course, the student will:

- Learn about various aspects of mechanics, centrifugal forces, mechanical forces with examples.
- Understand and explain molecular theory, Gauss's law, medical significance and applications of the dielectric properties of biological materials.
- Describe simple harmonic motion, diffraction, lasers and its applications in medical science.
- Appreciate the Doppler effect and the effects of vibrations in humans with respect to physics of hearing, heartbeat etc.
- Learn to investigate the light absorption properties of molecules through spectrophotometry, for qualitative and quantitative analysis of biomolecules

SYLLABUS OF DSC-7

Unit 1: Mechanics **6 Hours**

Conservation of momentum and energy, work energy theorem, Angular momentum, Torque, motion of a particle in the central force field. Influence of mechanical forces (Pressure, shear or elongation) on bone. Viscosity and viscous force, surface tension and viscoelasticity with examples such as, biopolymers, human tissues etc.

Unit 2: Dielectrics **6 Hours**

Dielectrics: Non polar/Polar dielectrics, Molecular theory of Dielectrics, Dielectric Constant, Gauss's Law in presence of dielectric, Three electric vectors and their relations, Electric susceptibility, Energy stored in dielectrics. Behaviour of dielectric in alternating field. Medical significance and applications of the dielectric properties of biological materials.

Unit 3: Waves and Optics **14 Hours**

Simple harmonic motion, Linearity and superposition Principle. Lissajous figures with equal and unequal frequencies and their uses. Effects of vibrations in humans: physics of hearing, heartbeat. Modern Optics: Superposition of waves: Young's double slit interference, Fraunhofer diffraction: diffraction through a single slit/double slit and grating, Resolving power, Resolution of the eye, Lasers: Principle, Population inversion, He-Ne Laser, characteristics of laser, Applications of lasers in medical science, Polarization by double refraction, Nicol prism. Doppler effect.

Unit 4: Spectroscopic techniques **4 Hours**

Beer-Lambert law, light absorption and its transmittance. UV and visible spectrophotometry-principles, instrumentation and applications. Fluorescence spectroscopy, static & dynamic quenching. light scattering in biology.

PRACTICALS

TOTAL HOURS: 60 **CREDIT: 2**

1. Determination of acceleration due to gravity using Kater's pendulum.
2. Determination of the acceleration due to gravity using bar pendulum.
3. Study of Lissajous figures using CRO.
4. Determination of the frequency of an electrically maintained tuning fork by Melde's Experiment.
5. Determination of the wavelength of laser source by through diffraction of (1) Single slit (2) Double slit.
6. Comparison of capacitances using De'Sautty's bridge.
7. Determination of the coefficient of Viscosity of water by capillary flow method (Poiseuille's method).
8. To determine wavelength of sodium light using Newton's Rings.
9. To determine the wavelength of sodium/mercury light using diffraction grating.
10. Verification of Beer Law.
11. Determination of Molar Extinction coefficient.

REFERENCES

1. D. Kleppner, R. J. Kolenkow (1973). An introduction to Mechanics. McGraw Hill.
2. N. K. Bajaj (2008). The Physics of Waves and Oscillations. 5th edition. Tata McGraw Hill.
3. Fundamentals of Optics, F.A Jenkins and H.E White, 1976, McGraw-Hill.
4. David Freifelder (1982). Physical Biochemistry: Applications to Biochemistry and Molecular Bioogy. 2nd edition. W.H. freeman and Company.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Protein Structure and Enzymology (BS-DSC-302)	**4**	**2**	**0**	**2**	Class XII pass with Biology and chemistry, as one of the papers in Class XII	**Should have studied Chemistry of Biomolecules**

Learning Objectives

The Learning Objectives of this course are as follows:

- Designed with an aim to introduce the students to proteins, most remarkable biomolecules in terms of diversity of structure and function
- Impart knowledge regarding various techniques employed to purify and characterize proteins
- Introduce them to the world of enzymes, biological catalysts with remarkable properties
- Enable them to understand important aspects of enzyme kinetics, mechanism of enzyme action and their regulatory properties
- Introduce the role of proteins and enzymes in medicine

Learning outcomes

Upon completion of the course, the students will be able to: