K. J. SOMAIYA COLLEGE OF SCIENCE AND COMMERCE , AUTONOMOUS

Certificate Course in BioPhysics

Course Details

Department of Physics and Microbiology
2019-2020

This document contains the structure of course, details of syllabus and evaluation pattern.

Course Details

- **Course type** : Certificate
- **Course Title** : Bio Physics

- **Course Coordinator** : Dr. Jitendra Pendharkar
  Dr. Lolly Jain
- **Syllabus** :

(A) Theory session:

1) Cell Structure:
Basics internal parts of cell. The shape, position and functioning of each part.

2) Thermodynamics of Cell:
Basic Principles of Thermodynamics, concept of entropy, cell as a interactive system with surroundings. Co relations of different terms used in thermodynamics with cell structure.
(This topic may be replaced by Hydrodynamics for moving cell at low Reynolds number)

3) Structure of Microscope (basic preparation of culture development)
Need and scope of microscope. The size of sample required. Explanation of different parts of microscope.

4) Nanotechnology for cells:
Dimensions of cells. Need of nano-probe. Measurement of elasticity and other quantities using nano technology(Bio AFM). Some observations can be shared with actual cell.

5) Group discussions and self study:

Group discussions are expected on some topics at the end of all theory sessions and field visit and also guided study time should be allotted to students.

(B)Practical session:

1) Physics Lab: Use of spectrometer, Laser, Ultrasonic Interferometer:

These are the basic apparatuses showed to students and mainly used in finding wavelength, velocity of sound in liquids and hence bulk modulus of solvent. Laser may be used as stimulus to cell as it was found that some cells moves away from intense light. Measurement of dielectric constant of different waxes extracted from biological materials. Study of dispersion of particles through semi-permeable artificial membranes.

2) Bio Physics Lab: this lab is situated in Kalina Campus, and in which students can perform certain experiments like study of alpha beta rays, diffusion property of semi-permeable membranes etc.

3) Microbiology Lab: Some observation on cell structure and movements:
Actual observation on ready culture and taking some readings on it. If possible actual preparation or steps involved in it can be shown to students.

4) Microbiology Lab: Demonstration experiments on Antibacterial Properties:
Effect of solutions containing nano particles made in the presence of different herbs on bacteria (gram positive and gram negative) can be shown using Agar solution in the laboratories.

(C) Visits to Research Institutes:
1) Bio Physics center, Kalina.

The Head of Bio-Physics department Prof Dr P M Dongre, is willing to show the facilities available and research scholars will plan some demonstration experiments (Raman Effect, Fluorescence properties of amino acids, particle size analyzer etc) for students. This will increase the research interest amongst students.

- **Evaluation Pattern :** There will be summative evaluation for 50 Marks.

20 Marks = Presentation [Students are expected to present a given topic out of 10 topics given to them]

30 Marks = Written Exam based on syllabus.