IISER Pune - Course Content

Semester	JAN 2025
Open to Semester	6,8,12,14,22
Course Code	BI4233
Course title	Cellular Biophysics 2
Nature of Course	LL - Lecture and Lab
Credit	3
Coordinator and participating faculty (if any)	**Dr. Chaitanya Athale**
Pre-requisites	Bi3144/6134
Objectives	We will discuss rate-equations as an approach to understand out of equilibrium biophysics. The fluid nature of cellular material and effect of high viscosity and low Reynolds numbers will be addressed by lectures and paper reading. We will also discuss theoretical and experimental approaches to integrate hierarchies of molecules and cells from a biophysics perspective. Research paper reading and two hands-on laboratory exercises will highlight case studies of the successful application of physics biological problems.
Course content	1) Fluid dynamics, low Reynolds number biology and cell motility (6) 2) Diffusion & Macromolecular crowding (4) 3) Lab 1: diffusion (2) 4) Dynamics of protein aggregation and cytoskeletal polymerization (6) 5) Lab 2: polymerization of microtubules (2) 6) Molecular motors and Brownian Ratchets (2) 7) Reaction diffusion patterns in embryogenesis (3) 8) Mechanics of development (2) 9) Paper reading (5)
Evaluation / Assessment	End-semester exam = 30 Mid-semester exam = 20 Paper reading= 25 Labs= 25
Suggested readings	Phillips, Kondev, Theriot. Physical Biology of the Cell. 2nd Edition, Garland Press* Philip Nelson Biological Physics: Energy Information, Life, Chiliagon Science* Howard Berg Random Walks in Biology, Princeton Universities Press*

	Jomathon Howard Mechanics of Motor Proteins and the Cytoskeleton, Oxford Universities Press* Vogel Life in Moving Fluids, Princeton Universities Press* Physical Models of Living System by Philip Nelson, WH Freeman*
When Next	2027
Date Uploaded	2024-10-23 15:27:12