

Course Code	BIO501		
Course Name	Cell Biology and Biochemistry		
Credits	2		
Course Offered to	PG - Core		
Course Description	The aim of this basic core course is to provide students a decent background in cell biology and biochenmistry. The major focus is to a) cover most important concepts in cell biology like structure and functions of cell, proteins, and signal transduction mechanisms b) cover biological thermodynamics, enzyme kinetics and metabolism and finally c) solve qualitative and quantitative problems.		
Pre-requisites			
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite (Other)	
None		None	
Post Conditions			
CO1	CO2	CO3	CO4
Students are able to identify stereochemical molecules, describe reaction mechanisms, and write empirical equations for weak forces and time scales in biology.	Students are able to write thermodynamics equations for chemical reactions, write Michealis-Menten kinetic equation, and solve it in MATLAB.	Students are able to model metabolic reactions and signaling networks using the laws of mass action kinetics.	
Weekly Lecture Plan			
Week Number	Lecture Topic	Cos met	Assignments/Lab/Tutorials
Week 1-2-3	Biochemistry.Quick overview of structure and function of carbon and nitrogenous molecules, stereo-isomers, bond angles, bond length in peptide bonds. Ramachandran plots, logic of biochemistry, simple reaction mechanisms like Substitution, elimination reactions etc with arrow	C01	Identifying and understanding the importance of bionumbers in E.coli and scaling the numbers to eukaryotes. HW- I is given.Provided MATLAB tutorial sheets . HW-II on the structure of biomolecules. HW-III on important integrals, finite and infinite series to solve probabilistic models in cell biology.
Week 4-5-6	Time-scales in cell biology, procedural, relative and manipulated time with examples from cell cycles, development and evolution.	C01	HW-IV MATLAB exercises to get PDF's, and learn to use inbuilt MATLAB probability distributions. Monte-carlo simulation to fit experimental data from cell biology.
Week 7-8-9	Intra and inter molecular forces, Weak forces like vander-waals, electrostatic forces etc. empirical equations that describe these forces, introduction to simulations .	C01	Problem solving to explain the importance of these forces
Week 10	Calculus and Thermodynamics/Statistical physics	CO2	Assignment will be given
Week 11-12-13	Enzyme kinetics and Allostery, Glucose metabolism	CO3	
Assessment Plan			
Type of Evaluation	% Contribution in Grade		
Mid-sem	25		
End-sem	25		
Assignments	15		
Quiz	20		
Project	15		
Resource Material			
Type	Title		
Textbook	Physical biology of the cell, Jane Kondev, Julie Theriot, and Rob Phillips .		
Textbook	Lehninger Principles of Biochemistry, Nelson and Cox		
Textbook	Essential cell biology 4th Ed. by Bruce Alberts, Dennis Bray, Karen Hopkin Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter		