

## NPTEL Video Lecture Topic List - Created by Linuxpert Systems, Chennai

NPTEL Video Course - Physics - NOC:Physics of Biological Systems

Subject Co-ordinator - Prof. Mithun Mitra

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction  
Lecture 2 - DNA packing and structure  
Lecture 3 - Shape and function  
Lecture 4 - Numbers and sizes  
Lecture 5 - Spatial scales and System variation  
Lecture 6 - Timescales in Biology  
Lecture 7 - Random walks and Passive diffusion  
Lecture 8 - Random walks to model Biology  
Lecture 9 - Derivation of FRAP equations  
Lecture 10 - Drift-diffusion equations  
Lecture 11 - Solutions of the drift-diffusion equations  
Lecture 12 - The cell signaling problem  
Lecture 13 - Cell Signalling and Capture Probability of absorbing sphere  
Lecture 14 - Capture probability of reflecting sphere  
Lecture 15 - Mean capture time  
Lecture 16 - Introduction to fluids, viscosity and reynolds number  
Lecture 17 - Introduction to the navier stokes equation  
Lecture 18 - Understanding reynolds number  
Lecture 19 - Life at low reynolds number  
Lecture 20 - Various phenomena at low reynolds number  
Lecture 21 - Bacterial flagellar motion  
Lecture 22 - Rotating flagellum  
Lecture 23 - Energy and equilibrium  
Lecture 24 - Binding problems  
Lecture 25 - Transcription and translation  
Lecture 26 - Internal states of macromolecules  
Lecture 27 - Protein modification problem  
Lecture 28 - Haemoglobin-Oxygen binding problem  
Lecture 29 - Freely jointed polymer model

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- Lecture 30 - Entropic springs and persistence length
- Lecture 31 - Freely rotating chain model and radius of gyration
- Lecture 32 - The hierarchical chromatin packing model
- Lecture 33 - FISH and DNA looping
- Lecture 34 - Nucleosomes as barriers, Hi-C, and contact probabilities
- Lecture 35 - Deriving the full force extension curve
- Lecture 36 - Random walk models for proteins
- Lecture 37 - Hydrophobic polar protein model
- Lecture 38 - Diffusion in crowded environments
- Lecture 39 - Depletion interactions
- Lecture 40 - Examples and implications of depletion interactions
- Lecture 41 - Introduction to Biological dynamics
- Lecture 42 - Introduction to rate equations
- Lecture 43 - Separation of timescales in enzyme kinetics
- Lecture 44 - Structure and treadmilling of actins and microtubules
- Lecture 45 - Average length of polymers in equilibrium
- Lecture 46 - Growth rate of polymers
- Lecture 47 - Dynamic treadmilling in microtubules
- Lecture 48 - Introduction to molecular motors
- Lecture 49 - Force generation by molecular motors
- Lecture 50 - Models of motor motion
- Lecture 51 - molecular motors
- Lecture 52 - Free energies of motor for stepping
- Lecture 53 - Two state models
- Lecture 54 - cooperative transport of cargo
- Lecture 55 - Cytoskeleton as a motor
- Lecture 56 - translocation ratchet
- Lecture 57 - Spatial pattern in biology
- Lecture 58 - Some common spatial patterns in biology
- Lecture 59 - reaction diffusion and spatial pattern
- Lecture 60 - Pattern formation in reaction diffusion system with stability
- Lecture 61 - Condition for destabilization in pattern formation
- Lecture 62 - Schnakenberg kinetics