

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

NPTEL Video Course - Biotechnology - NOC:Biomechanics

Subject Co-ordinator - Prof. Varadhan

Co-ordinating Institute - IIT - Madras

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

Lecture 1 - Introduction to forces - Resolving forces, principle of transmissibility

Lecture 2 - Statics FBD and EOE

Lecture 3 - Example problems on FBD and EOE

Lecture 4 - Joints in human body

Lecture 5 - Machines and mechanical advantage

Lecture 6 - Levers and types of levers

Lecture 7 - Insertion point and torque

Lecture 8 - Practice problem - 1

Lecture 9 - Practice problem - 2

Lecture 10 - Key terminologies

Lecture 11 - Anatomical planes and axis

Lecture 12 - Sagittal plane movements

Lecture 13 - Coronal plane movements

Lecture 14 - Transverse plane movements

Lecture 15 - Muscles - Muscle fascicles

Lecture 16 - Muscle fibers- Pennation angle

Lecture 17 - More on pennation angle

Lecture 18 - Excitation contraction coupling

Lecture 19 - Sliding filament theory

Lecture 20 - Force length relationship

Lecture 21 - Shoulder joints and muscles

Lecture 22 - Shoulder problem - 1

Lecture 23 - Shoulder problem - 2

Lecture 24 - Elbow theory

Lecture 25 - Elbow problem - 1

Lecture 26 - Elbow problem - 2

Lecture 27 - Elbow problem - 3

Lecture 28 - Wrist theory

Lecture 29 - Finger theory

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- Lecture 30 - Finger muscles
- Lecture 31 - Spine anatomy and movements
- Lecture 32 - Spine muscles
- Lecture 33 - Spine problem
- Lecture 34 - Hip anatomy and movements
- Lecture 35 - Hip muscles
- Lecture 36 - Hip problem
- Lecture 37 - Knee anatomy and movements
- Lecture 38 - Knee muscles
- Lecture 39 - Knee problem
- Lecture 40 - Ankle anatomy and movements
- Lecture 41 - Ankle muscles
- Lecture 42 - Ankle problem
- Lecture 43 - Grasping- reaching- chains
- Lecture 44 - D.O.F mobility, open/closed chain
- Lecture 45 - Forward kinematics and workspace
- Lecture 46 - 2R inverse kinematics
- Lecture 47 - 3R kinematics forward and inverse
- Lecture 48 - D-H parameters
- Lecture 49 - Velocity and jacobian
- Lecture 50 - 3R velocity
- Lecture 51 - Tissues and types of tissues
- Lecture 52 - Bone microstructure and cells
- Lecture 53 - Properties of bones
- Lecture 54 - Wolffs Law and Hookean behavior
- Lecture 55 - Elastic properties and stress strain relations
- Lecture 56 - Stress strain curve and mechanical properties of biological materials
- Lecture 57 - Bending of Bones
- Lecture 58 - Viscoelastic modelling
- Lecture 59 - Maxwell Model
- Lecture 60 - Voight Model
- Lecture 61 - Kelvin model
- Lecture 62 - Viscoelasticity in bones
- Lecture 63 - Tissues and its constituents
- Lecture 64 - Cartilages, ligaments and tendons
- Lecture 65 - Stress strain relations in tendons
- Lecture 66 - Tendon forces and factors affecting tendon property
- Lecture 67 - Gliding resistance, tendon wrapping and friction forces
- Lecture 68 - Enslaving - Intertendinous force transfer and motor units

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

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- Lecture 69 - Introduction to enslavement
- Lecture 70 - Enslaving effects in finger force production - 1
- Lecture 71 - Enslaving effects in finger force production - 2
- Lecture 72 - Wrist posture and finger interdependence - 1
- Lecture 73 - Wrist posture and finger interdependence - 2
- Lecture 74 - Wrist posture and finger interdependence - 3
- Lecture 75 - Measurement of orientation in 3D space - Devices
- Lecture 76 - Rotation matrices in 2D and 3D2
- Lecture 77 - Animating using rotation matrices- Matlab Examples
- Lecture 78 - Composite rotation matrix and relative orientations
- Lecture 79 - Complex numbers and quaternions
- Lecture 80 - Singularity, Gimbal Lock, Advantages and disadvantages of parameterization methods
- Lecture 81 - Single finger kinematics measurement using IMU's
- Lecture 82 - IMU based Full hand kinematics measurement system (HKMS)
- Lecture 83 - Demonstration of the Hand Kinematics Measurement System (HKMS)
- Lecture 84 - Introduction to Gait and running