

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

NPTEL Video Course - Mechanical Engineering - NOC:Biomechanics of Joints and Orthopaedic Implants

Subject Co-ordinator - Prof. Sanjay Gupta

Co-ordinating Institute - IIT - Kharagpur

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

Lecture 1 - General Introduction to the Course  
Lecture 2 - Musculoskeletal System  
Lecture 3 - Synovial Joints  
Lecture 4 - The Hip Joint  
Lecture 5 - The Knee Joint  
Lecture 6 - The Shoulder and Elbow Joints  
Lecture 7 - The Spine  
Lecture 8 - Biomechanics of the Hip Joint  
Lecture 9 - Biomechanics of the Knee Joint  
Lecture 10 - Biomechanics of the Shoulder Joint  
Lecture 11 - Biomechanics of the Elbow Joint - Part I  
Lecture 12 - Biomechanics of the Elbow Joint - Part II  
Lecture 13 - Biomechanics of the Spine  
Lecture 14 - Gait Cycle  
Lecture 15 - Gait Analysis and Abnormalities  
Lecture 16 - Measurement Techniques of Gait Analysis - Part I  
Lecture 17 - Measurement Techniques of Gait Analysis - Part II  
Lecture 18 - Motion Capture System  
Lecture 19 - Fundamentals of Joint Kinematics  
Lecture 20 - Joint Kinematics and Kinetics  
Lecture 21 - Introduction to Musculoskeletal Modelling  
Lecture 22 - Inverse Dynamics in Musculoskeletal Modelling  
Lecture 23 - Muscle Force Estimation Using Static Optimization  
Lecture 24 - Concepts of Stress and Strain  
Lecture 25 - Stress Transformation  
Lecture 26 - Bone Structure and Mechanical Behaviour  
Lecture 27 - Bone Adaptation and Viscoelastic Behaviour  
Lecture 28 - Anisotropic Nature of Bone  
Lecture 29 - Implant Classification and Failure Mechanisms

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- Lecture 30 - Introduction to Finite Element Modelling of Bone and Implant
- Lecture 31 - Finite Element Modelling and Analysis of Hip and Shoulder
- Lecture 32 - Modelling and Analysis of Intact and Implanted Lumbar Spine
- Lecture 33 - Experimental Validation of Pre-Clinical Analysis
- Lecture 34 - Adaptive Bone Remodelling
- Lecture 35 - Bone Remodelling Around Resurfaced Femur and Pelvic Bone
- Lecture 36 - Design Optimization of HIP Implant
- Lecture 37 - Orthotropic Bone Remodelling
- Lecture 38 - Biomaterials and Design of Orthopaedic Implants
- Lecture 39 - Bone Fracture Healing
- Lecture 40 - Bone Ingrowth and Mechanoregulatory Principles
- Lecture 41 - Mathematical Modelling of Tissue Differentiation
- Lecture 42 - Bone Ingrowth around Porous Coated Femoral Implant
- Lecture 43 - Tissue Differentiation around Porous Coated Acetabular Implant
- Lecture 44 - Concluding Remarks