



National University of Sciences and Technology

Course Description

Course Title	Course Code	Credit Hours
Computational Biomechanics	ME-827	3 – 0

- **Textbooks:**

- Introduction to Biomechanics: From Cells to Organisms" by C. Ross Ethier and Craig A. Simmons

- **Reference Books:**

- "Computational Biomechanics for Medicine: Soft Tissues and the Musculoskeletal System" by Adam Wittek, Karol Miller, and Poul M.F. Nielsen
- "Biomechanics: Principles and Applications" by Donald R. Peterson and Joseph D. Bronzino

- **Course Objectives:**

- To understand the principles of biomechanics and its applications to human movement and to develop proficiency in numerical methods used for modeling and simulating biomechanical systems

- **Course Outline:**

- Introduction to Biomechanics
- Definition of biomechanics
- Types of biomechanical analyses
- Applications of biomechanics to human movement
- Kinematics and Kinetics
- Motion analysis
- Force analysis
- Joint torques and moments
- Modeling of Biomechanical Systems
- Rigid-body dynamics
- Finite element analysis
- Multibody dynamics
- Numerical Methods in Biomechanics
- Numerical integration
- Optimization techniques
- Monte Carlo simulation
- Experimental Validation of Biomechanical Models
- Data acquisition and processing
- Model validation techniques
- Uncertainty analysis

ASSESSMENTS

Description	Percentage Weightage (%)
Assignments	05-10%
Quizzes	10-15%
Mid Semester Exams	30-40%
End Semester Exam	40-50%

