

INTRODUCTION TO SPORTS BIOMECHANICS & KINESIOLOGY

Course Code PE-323 Credit Hours 3 (2-1)

Course Description:

This course introduces the principles of biomechanics and kinesiology, emphasizing their application in sports performance and injury prevention. It explores the mechanics of human movement and the role of anatomical structures in physical activities, enabling students to analyze and improve athletic techniques.

Course Learning Outcomes (CLOs):

By the end of this course, students will be able to:

1. Understand fundamental concepts of biomechanics and kinesiology.
2. Analyze human movement using basic biomechanical principles.
3. Evaluate the functional roles of muscles, bones, and joints in athletic performance.
4. Apply knowledge to improve technique and reduce injury risk in various sports.
5. Use motion analysis tools and techniques in a practical context.

Course Content:

Week 1-2

Introduction to Biomechanics and Kinesiology

- Definitions and Scope
- Historical Development
- Importance in Sports Performance
- Planes and Axes of Movement

Week 3-4

Musculoskeletal System

- Anatomy and Functions of Bones, Joints, and Muscles
- Types of Muscle Contractions
- Role of Ligaments and Tendons in Movement
- **Practical:** Identification of Bones and Muscles

Week 5-6

Basic Mechanical Concepts

- Force, Levers, and Torque
- Center of Gravity and Stability
- Linear and Angular Kinematics
- **Practical:** Demonstrating Types of Levers in Sports

Week 7-8

Motion Analysis

- Phases of Movement: Preparation, Execution, and Recovery
- Tools for Motion Analysis
- **Practical:** Video Analysis of Athletic Movements

Week 9-10

Biomechanics of Specific Movements

- Running, Jumping, and Throwing Mechanics
- Analyzing Techniques in Selected Sports (e.g., Cricket, Bowling, Tennis Serve)
- **Practical:** Motion Analysis of a Specific Athletic Skill

Week 11-12

Injury Mechanics and Prevention

- Common Sports Injuries and Their Biomechanical Causes
- Role of Biomechanics in Rehabilitation
- **Practical:** Identifying Risk Factors in Sports Movements

Week 13-14

Applied Kinesiology in Sports Training

- Designing Sports-Specific Drills
- Muscle Recruitment and Fatigue Patterns
- **Practical:** Creating and Evaluating Drills for Optimal Performance

Week 15-16

Final Review and Assessment

- Theory Review: Key Concepts and Applications
- Practical Review: Demonstrations of Skills Analyzed
- Final Project: Motion Analysis and Performance Enhancement Plan

Teaching and Learning Methods:

- **Lectures:** Core biomechanical and anatomical concepts with visual aids
- **Practical Workshops:** Hands-on sessions analyzing movement and mechanics
- **Video Analysis:** Tools and techniques for performance evaluation
- **Group Discussions:** Application of principles to real-world scenarios
- **Case Studies:** Injury analysis and prevention strategies

Recommended Books (APA Style):

1. Hall, S. J. (2019). *Basic biomechanics* (8th ed.). New York: McGraw-Hill Education.
2. Knudson, D. V. (2021). *Fundamentals of biomechanics: Equilibrium, motion, and deformation* (3rd ed.). Springer.
3. Hamill, J., & Knutzen, K. M. (2020). *Biomechanical basis of human movement* (5th ed.). Wolters Kluwer Health.
4. Floyd, R. T. (2021). *Manual of structural kinesiology* (21st ed.). McGraw-Hill Education.
5. Bartlett, R. (2018). *Introduction to sports biomechanics: Analysing human movement patterns* (3rd ed.). Routledge.