

Semester – IV
PART – A: THEORY COURSE
BTC-402: KINESIOLOGY AND BIOMECHANICS

Credit			Teaching Hours			Assessment		
L/T	P/I	Total	L/T	P/I	Total	Int.	Ext.	Total
2	-	2	32	-	32	15	35	50

Lecture/Tutorials, P/I=Practical/Internship, Int.=Internal, Ext.=External

ESSENCE OF THE COURSE

Knowledge of Kinesiology and Biomechanics is important for understanding the human movement, including those involved in sports and games. This course begins with an overview of Kinesiology and Sports Biomechanics followed by fundamental concepts, mechanical concepts, kinematics and kinetics of human movement.

COURSE LEARNING OUTCOME

After completing this course, the students will be able to

- define and describe the term kinesiology and biomechanics.
- explain mechanical concepts (force, lever, Newton’s laws of motion and Projectile).
- develop the knowledge and appreciation of the importance of the study of kinesiology as a foundation for further studies in biomechanics and performance analysis.
- develop an understanding of the fundamental connection between structure and basic functions for muscles and joints.
- identify the goals of exercise and sports biomechanics.
- describe the methods used to achieve the goals of exercise and sports biomechanics.
- analyse sport movements and design movement-oriented exercise prescriptions.

COURSE CONTENTS

Unit – I Introduction to Kinesiology and Sports Biomechanics

- Meaning and Definition of Kinesiology and Sports Biomechanics
- Importance of Kinesiology and Sports Biomechanics for Physical Education Teachers, Athletes and Sports Coaches.

Unit – II Fundamental Concept

- Fundamental concepts of following terms – Axes and Planes, Centre of Gravity, Equilibrium, Line of Gravity
- Fundamental movements at various joints
- Fundamental concepts of the following terms- Angle of Pull, All or None Law, Reciprocal Innervation,

Unit – III Mechanical Concepts

- Force - Meaning, definition, types and its application to sports activities
- Lever - Meaning, definition, types and its application to human body.
- Newton’s Laws of Motion – Meaning, definition and its application to sports activities.
- Projectile – Factors influencing projectile trajectory.

Unit – IV Kinematics and Kinetics of Human Movement

- Brief introduction of
 - Linear Kinematics – Distance and Displacement, speed and velocity, Acceleration
 - Angular kinematics – Angular Distance and Displacement, Angular Speed and velocity, Angular Acceleration.
 - Linear Kinetics – Inertia, Mass, Momentum, Friction.
 - Angular Kinetics – Moment of inertia, Couple, Stability.

List of Practicum

- Locating of muscles with the help of model/chart
- Calculation of displacement, speed and velocity, acceleration,
- Locating of center of gravity of rigid bodies.
- Assessment of angular kinematics of one plane movements.
- Conversion of angular kinematics.
- Draw stick figures from the photograph of sporting movements.

TEACHING LEARNING STRATEGIES

- The content of the syllabus may be taught by using lecture method, discussion method, quiz method, educational videos, movement analysis of different sports skill through virtual skills of different sports and games (movement patterns from Youtubes and famous sports videos of sports skills/techniques) human skeleton/system model (3D anatomy and 3D physiology software and virtual Video), charts and assignment method depending upon the resources and facilities available at the University/Institute/ Department/Colleges.

MODE OF TRANSACTION

- Field Work/Project Work/Viva/Seminars/Term Papers/Presentations/Self- Learning Instructional Material etc.

ASSESSMENT RUBRICS

- End Semester Exam **Marks: 35**
- Classroom Test, Project Work, Assignments, Presentations **Marks: 15**
 - Classroom Tests: Best one out of two unit tests **Marks: 05**
 - Project Work, Assignments, Presentations **Marks: 10**

Marks: 50

SUGGESTED READINGS

- Bunn, J. W. (1972). *Scientific principles of coaching*. Englewood Cliffs, N.J.: Prentice Hall Inc.
- Hay, J. G. & Reid, J. G. (1982). *The anatomical and mechanical basis of human motion*. Englewood Cliffs, N.J.: prentice Hall Inc.
- Hay, J. G. & Reid, J. G. (1988). *Anatomy, mechanics and human motion*. Englewood Cliffs, N.J.: prentice Hall Inc.
- Hay, J. G. (1970). *The biomechanics of sports techniques*. Englewood Cliffs, N.J.: Prentice Hall, Inc.
- Simonian, C. (1911). *Fundamentals of sport biomechanics*. Englewood Cliffs, N.J.: Prentice Hall Inc.