

Semester IV
Theory course
IMTC 402 - KINESIOLOGY AND BIOMECHANICS

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.
-) Analyze sport movements and design movement-oriented exercise prescriptions.

COURSE CONTENTS

17.1 UNIT I

Meaning, nature, role and scope of Applied kinesiology and Sports Biomechanics. Meaning of Axis and Planes, Dynamics, Kinematics, Kinetics, Statics Centre of gravity -Line of gravity plane of the body and axis of motion, Vectors and Scalars.

17.2 UNIT II

Origin, Insertion and action of muscles: Pectoralis major and minor, Deltoid, Biceps, Triceps (Anterior and Posterior), Trapezius, Serratus, Sartorius Rectus femoris, Rectus femoris, Rectus Abdominus, Quadriceps, Hamstring, Gastrocnemius.

17.3 UNIT III

Meaning and definition of Motion. Types of Motion: Linear motion, angular motion, circular motion, uniform motion. Law of acceleration, Principles related to the law of Inertia, Law of acceleration, Law of counter force. Meaning and definition of force- Sources of force -Force components .Force applied at an angle -pressure -friction -Buoyancy, Spin - Centripetal force - Centrifugal force.

17.4 UNIT IV

Freely falling bodies -Projectiles -Equation of projectiles stability Factors influencing equilibrium - Guiding principles for stability -static and dynamic stability. Meaning of work, power, energy, kinetic energy and potential energy. Leverage -classes of lever - practical application. Water resistance - Air resistance -Aerodynamics. Analysis of Movement : Types of

analysis: Kinesiological, Biomechanical. Cinematographic. Methods of analysis – Visual,

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: 50 |
| o Written Test | Marks: 35 |
| o Practicum | Marks : 20 |
|) Classroom Test, Project Work, Assignments, Presentations | Marks : 15 |
| o Classroom Tests: Best one out of two unit tests | Marks: 5 |
| o Project Work, Assignments, Presentations | Marks: 10 |

REFERENCES:

1. Steven Roy, & Richard Irvin. (1983). Sports Medicine. New Jersey: Prentice hall.
2. Thomas. (2001). Manual of structural Kinesiology, New York: Me Graw Hill.
3. Uppal, A (2004), Kinesiology in Physical Education and Exercise Science, Delhi Friends publications.
4. Williams M (1982) Biomechanics of Human Motion, Philadelphia; Saunders Co.