

SEMESTER-VI

B.A. (Prog.) with Physical Education as a Major

DISCIPLINE B6-(4): B.A.-PE-DSC-6-(4)-SPORTS BIOMECHANICS

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
DISCIPLINE B6-(4): B.A.-PE-DSC-6(4)- SPORTS BIOMECHANICS	4	3	0	1	Class XII pass	NIL

Learning Objective: The objective of this course is to provide an understanding and practice to the learners about Biomechanics and its application in sports and develop the foundation to learn performance analysis.

Learning Outcomes:

1. The learners will be able to understand the fundamental concepts and practical applications related to biomechanics.
2. The learners will be able to demonstrate and correlate different components of the science of motion (human).
3. The learners will be able to analyze the sports/ exercise movements and design movement-oriented exercises.
4. The learners will be able to develop the exercise program for strengthening and stretching the muscles based on biomechanics.
5. The learners will be able to apply the knowledge and skills related to the science of movement/ motion to create a strong foundation for better sports performance.

SYLLABUS

CREDITS: 4 [Theory-3, Practical-1]

Theory-45 hours

Practical-30 hours

PART-A: THEORY

Unit-I: Introduction to Sports Biomechanics

(10 hours)

- 1.1 Meaning and Definition of Sports Biomechanics.
- 1.2 Aim, Objectives, and Scope of Sports Biomechanics in Physical Education and Sports
- 1.3 Importance of Sports Biomechanics for Physical Education Teachers, Athletes, and Coaches

Unit-II: Anatomical Fundamental Concepts in Sports Biomechanics (11 hours)

- 2.1 Fundamental Anatomical positions
(Anterior, Posterior, Superior, Inferior, Lateral, Medial)
- 2.2 Fundamental Movements
(Flexion, Extension, Abduction, Adduction, Rotation, Circumduction, Medial and Lateral rotation, Inversion, Eversion, Supination, Pronation)
- 2.3 Fundamental Concepts- Centre of Gravity, Line of Gravity, Axis, and Planes of Motion.

Unit-III: Location, Action of Muscles and Movement Qualities (12 hours)

- 3.1 Location and action of muscles at various joints: upper extremity: pectoralis major – pectoralis minor – deltoid – biceps brachii – triceps – teres major – latissimus dorsi – trapezius
- 3.2 Location and action of muscles at various joints: Lower extremity: rectus femoris – vastus group – Sartorius – biceps femoris – semi membranous – semi tendinosis– gluteus – gastrocnemius muscles
- 3.3 Movement Qualities: Movement Rhythm, Movement Precision, Movement Amplitude, Movement Coupling, Movement tempo, Movement Flow

Unit-IV: Biomechanical Concepts of Motion (12 hours)

- 4.1 Motion, Types of motion, Linear and Angular motion, Newton's Laws of Motion, Levers
- 4.2 Linear Kinematics and Kinetics: Speed, velocity, acceleration, mass, weight, force, friction
- 4.3 Angular Kinematics and Kinetics: Angular Speed, angular velocity, angular acceleration, moment of inertia, conservation of momentum and transfer of momentum.

PART-B: PRACTICALS (30 Hours)

- 1. Demonstration of planes and axes of a given movement.
- 2. Demonstration of various movements around a joint. (Any two joints)
- 3. Determination of the location of muscles at various joints. (Any two joints)
- 4. Determination of the center of gravity of a bat/ racket (suspension method)

Marking Scheme:

Theory Written Exam	:	90 Marks
Internal Assessment	:	30 Marks
Practical	:	40 Marks

Suggested Readings:

- 1. Broer, M.R. **Efficiency of Human Movement** (Philadelphia: W.B. Saunders Co. 1969.
- 2. Bunn, J. W. (1972). Scientific principles of coaching. Englewood Cliffs, N.J.: Prentice Hall Inc.
- 3. Dhanajoy.S., 2005, “**Pedagogic of Kinesiology**”, Sports Publication, Chennai.
- 4. Gerry Carr, Mechanics of Sport Human Kinetics, 199
- 5. Hay, J. G. & Reid, J. G. (1982). **The anatomical and mechanical basis of human motion.** Englewood Cliffs, N.J.: Prentice Hall Inc.
- 6. Hay, J. G. & Reid, J. G. (1988). **Anatomy, mechanics, and human motion.** Englewood Cliffs, N.J.: Prentice Hall Inc.
- 7. Hay, J. G. (1970). **The biomechanics of sports techniques.** Englewood Cliffs, N.J.: Prentice Hall, Inc.

8. James G. Hay, **The Biomechanics of Sports Techniques**. Prentice Hall International Inc, New Jersey 1993.
9. Katharine, F. Luttgens Kathryn, **Kinesiology – Scientific Basis of Human motion Singapore**: Mc. Graw Will International Book Company, 1984)
10. Kathryn Lutgens et al. **Kinesiology (Scientific Basis of Human Motion)**, Brown and Bench mark, 1992.
11. Rasch and Burke, **Kinesiology and applied Anatomy** (Philadelphia: Leaand Fiber, 1967)
12. Roger Bartlett, **Introduction to Sports Biomechanics**. E& FN Spon New York 1997
13. Simonian, C. (1911). **Fundamentals of sport biomechanics**. Englewood Cliffs, N.J.: Prentice Hall Inc.
14. Shaw D. (2018). **“Pedagogic Kinesiology”** Sports Publication, ISBN: 978-93-86592-43-9.
15. Shaw D. (2019) **“Kinesio Taping in Games and Sports”** Sports Publication, ISBN: 978-93-88269-33-9.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.