

**Curriculum and Credit Framework as per
NEP 2020**

**For
Physical Education
in
B.A Multidisciplinary
Opt 3 Disciplinary Courses**

4th Semester

(To be effective from the Academic Session 2024-25)



Department of Law & Humanities
Gurugram University, Gurugram
(A State Govt. University Established Under Haryana Act 17 Of 2017)

YV 9/12/25

BA 4th Sem
Biomechanics & Kinesiology in Physical Education
 Scheme UG A1: Undergraduate Programmes (Multidisciplinary)

Course Code	Course Title	Course ID	L	T	P	L	T	P	Credits	MARKS				
			(Hrs)			Credits				TI	TE	PI	PE	Total
Core Course(s)														
CC-A4	Biomechanics & Kinesiology in Physical Education		2		4	2		2	4	15	35	15	35	100

Learning Objectives:

- Upon successful completion of this course, students will be able to:
- Understand the basic anatomical structures and their roles in human movement.
- Describe fundamental biomechanical principles related to motion, forces, and energy.
- Analyze human movement qualitatively and quantitatively.
- Identify and explain the biomechanical factors influencing various physical activities and sports skills.
- Apply biomechanical and kinesiological principles to enhance movement efficiency and reduce injury risk.
- Understand the concepts of stability, balance, and leverage in human movement.
- Analyze common movement patterns and identify potential biomechanical limitations.

For Paper Setter: Set eight questions in all. Question one is small answer type questions from all units. Each question of Seven marks.

For Students: Attempt any Five questions. Question One is compulsory. All questions carry equal marks.

Unit 1: Foundations of Anatomy, Physiology, and Biomechanics

- 1.1 Introduction to Kinesiology and Biomechanics
- 1.2 Basic Anatomical Terminology and Joint Structure
- 1.3 Skeletal System and Muscular System Overview
- 1.4 Forces and Newton's Laws of Motion

Unit 2: Kinetic Structure of Human Movement:

- 2.1 Fundamental Mechanical Principles: Linear and Angular Motion
- 2.2 Kinetics of Linear Motion: Impulse and Momentum
- 2.3 Kinetics of Angular Motion: Torque and Rotational Inertia
- 2.4 Work, Power, and Energy in Human Movement

Unit 3: Biomechanical Analysis of Human Movement:

- 3.1 Linear Kinematic Analysis: Displacement, Velocity, and Acceleration
- 3.2 Angular Kinematic Analysis: Angular Displacement, Velocity, and Acceleration
- 3.3 Projectile Motion
- 3.4 Fluid Mechanics in Sport: Drag and Lift, Magnus Effect

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Unit 4: Applications in Physical Education and Sport:

- 4.1 Biomechanics of Fundamental Motor Skills: Walking, Running, Jumping, lifting, Throwing
- 4.2 Mechanical and Physiological principles of human movement
- 4.3 Injury Mechanisms and Prevention through Biomechanics
- 4.4 Biomechanical Foundation of Rehabilitation

Practical Work:

- Joint Action, Axis & Plane of various moments
- Understanding and location of Various Muscles of Shoulder, Elbow, Hip, Knee, Ankle & Wrist Joints
- Measuring the Centre of Gravity & Balance through selected tests (conduct test on five members)

Suggestive Readings:

1. Hall, S.J. (2022), Basic Biomechanics (9th ed.), New York: McGraw-Hill Education.
2. Hamill, J., Knutzen, K.M. & Derrick, T. (2021). Biomechanical Basis of Human Movement (5th ed.). Philadelphia: Wolters Kluwer.
3. McGinnis, P.M. (2020), Biomechanics of Sport and Exercise (3rd ed.). Champaign, IL: Human Kinetics.
4. Rasch, P.J. & Burke, R.K. (2013), Kinesiology and Applied Anatomy (10th ed.). Philadelphia: Lippincott Williams & Wilkins.
5. Enoka, R.M. (2015), Neuromechanics of Human Movement (5th ed.). Champaign, IL: Human Kinetics.
6. Kansal, D.K. (2010), A Textbook of Biomechanics and Kinesiology. New Delhi: Sports and Spiritual Science Publications.
7. Verma, J.P. (2014), Kinesiology and Biomechanics. New Delhi: Sports Publication.
8. Uppal, A.K. (2005), Kinesiology in Physical Education and Exercise Science. New Delhi: Friends Publications.
9. Raj Shree (2012), Applied Kinesiology and Biomechanics. New Delhi: Khel Sahitya Kendra.
10. Singh, Ajmer et al. (2011), Essentials of Physical Education. (Includes biomechanics and kinesiology section) New Delhi: Kalyani Publishers.
11. Nordin, M. & Frankel, V.H. (2012), Basic Biomechanics of the Musculoskeletal System (4th ed.). Philadelphia: Lippincott Williams & Wilkins.
12. Thompson, C.W. (2009), Manual of Structural Kinesiology (17th ed.). Boston: McGraw-Hill.

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