	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Minor degree in Sports Engineering**				Year of Regulation		**2024**	
Department	**Mechanical Engineering**				Semester		**IV**	

Course Code	Course Name		Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
ME 262	**Biomechanics in sports**		3	0	0	3	50	50	100	200

Course Objectives	The students will able to know the biomechanics of sports, mechanical property of the human body, and gait analysis.	Course Outcomes	**CO1**	Able to understand the principles and concept of biomechanics, linear and angular characteristics of motion.
			CO2	Able to explain the structure, mechanical property of the human Body.
			CO3	Able to understand motion of human body kinematics and musculature.
			CO4	Able to understand motion of human movement in fluid medium and aerodynamic coefficients.
			CO5	Able to understand the gait analysis and various sports skills.

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	CO1	3	2	-	-	-	-	-	2	-	-	-	2	-	-
2	CO2	3	2	-	-	-	-	-	2	-	-	-	2	-	-
3	CO3	3	2	-	-	-	-	-	2	-	-	-	2	-	-
4	CO4	3	2	-	-	-	-	-	2	-	-	-	2	-	-
5	CO5	3	2	-	-	-	-	-	2	-	-	-	2	-	-
6	CO6	-	-	-	-	-	-	-	-	-	-	-	0	-	-

SYLLABUS			
No.	Content	Hours	COs
I	Role of Bio–Mechanics in the field of Sports Science, Principles of Biomechanics; Biomechanical Concepts: Motion, Newton's law of Angular Motion and Linear Motion and its relationships, Force, Centripetal and Centrifugal forces, Equilibrium, Centre of Gravity and Stability, Freely falling bodies and Projectile, Momentum, Impulse, Lever and its Classification, Work, power, Energy: Relationship of Work, Power and Energy, Friction, Spin, Impact, Elasticity, Rebound, Air resistance and Water Resistance.	10	CO1
II	Mechanical Property of the Human Body: Material components of the body and their elastic properties, time-independent deviations in hookean materials, static equilibrium of deformable bodies, time-dependent deviations from elastic behavior: viscoelasticity, viscoelasticity in bone, bone fractures, common sports injuries, avoiding fractures and other injuries: materials for helmets.	8	CO2
III	Linear kinematics of human movement, Motion of Human Body Kinematics and musculature: Mechanics of standing, walking, running, jumping, throwing a ball and other types of motions, collisions of the human body, sustained acceleration, physics of sports.	5	CO3
IV	Human movement in a fluid medium: Basic fluid mechanic theory, fluid properties, buoyancy, centre of volume, drag, coefficient of drag, skin friction, surface drag, viscous drag, form drag, pressure drag, wave drag- lift force, Bernoulli principle, angle of attack, lift drag ration- Magnus effect, Theory of similitude and scaling, propulsive drag theory, propulsive lift theory, vortex generation.	7	CO4
V	Introduction to Gait Analysis, Mechanical Analysis of Sports Skills: Athletics (Running, Jumping and Throwing), Swimming, Football, Basketball, Volleyball, Cricket. Technological Use and Advances in Biomechanics	6	CO5
	Total Hours	36	

Essential Readings

1. Roger Bartlett., Introduction to sports biomechanics: Analysing Human movement patterns, 2nd Edition, Routledge, Tailor and Francis Group. 2007
2. Susan J. Hall., Basic Biomechanics, 4th edition, Mc Graw Hill, 2003

Supplementary Readings

1. Michael Yessis., Biomechanics and Kinesiology of Exercise, Ultimate Athlete Concepts, 2013
2. Duane Knudson, Fundamentals of Biomechanics, Springer publication, 2ndEdition, 2007
3. Donald R. Peterson and Joseph D. Bronzino, Biomechanics Principles and applications, CRC press, Taylor & Francis Group, LLC, 2008