



National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	Bachelor of Technology in Mechanical Engineering	Year of Regulation	2018
Department	Mechanical Engineering	Semester	VII

Course Code	Course Name	Credit Structure				Marks Distribution				
		L	T	P	C	INT	MID	END	Total	
ME 425	BIOMECHANICS	3	0	0	3	50	50	100	200	
Course Objectives	To acquire knowledge and understand the basic mechanical concepts involved in human movement.	Course Outcomes	CO1	Able to understand the basic terminologies used in Bio-mechanics						
	To develop the skills to analyse various body components and design various rehabilitation equipment's.		CO2	Able to understand static motion of human body						
	To apply the skills and techniques to solve the practical problems of the society.		CO3	Able to understand motion of human body kinematics and musculature						
			CO4	Able to explain the structure, mechanical property of the Human Body						
			CO5	Able to explain the principles of muscles skeletal muscles in the body						
			CO6	Able to solve the inverse kinematics problems related to motion of the human body						

No.	Cos	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	3	0	0	0	0	0	0	0	0	0	0	3	0	0
2	CO2	3	3	0	0	0	0	0	2	0	0	0	2	2	0	0
3	CO3	3	3	0	0	2	0	0	2	0	0	0	2	2	0	0
4	CO4	3	3	0	0	2	0	0	2	0	0	0	2	2	0	0
5	CO5	3	3	0	0	2	0	0	2	0	0	0	2	3	0	0
6	CO6	3	3	0	0	2	0	0	3	0	0	0	2	0	0	0

SYLLABUS

No.	Content	Hours	COs
I	Terminologies used in Bio-mechanics: Anatomical terminology, motion in the human machine, the standard human scaling relationships.	06	CO1
II	Statics of Human Body: Review of forces, torques, and equilibrium, motion in one plane and levers, statics in the body, the sense of touch, units of force and pressure.	06	CO2
III	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.	06	CO3
IV	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.	06	CO4
V	Study of Muscles Skeletal muscles in the body: The structure of muscles, passive muscles, activating muscles, a macroscopic view, the effect of exercise on muscles and their coordination, active/tetanized muscles, a microscopic view, hill force-velocity curve, the sliding filament model, a nanoscopic view.	06	CO5
VI	Advanced topics Kinematics: Inverse Kinematics, Inverse dynamics, Denavit-Hartenberg convention etc.	06	CO6
Total Hours		36	

Essential Readings

- Susan J Hall, "Basic Biomechanics", McGraw-Hill Higher Education, 7th edition, 2014.
- Donald R. Peterson and Joseph D. Bronzino, "Biomechanics- Principles and Applications", CRC Press, 2nd edition, 2008.

Supplementary Readings

- Duane Knudson, "Fundamental of biomechanics", Springer, 2ndedition, 2007.
- Fung Y C, Biomechanics: "Mechanical Properties of Living Tissues", Springer, 2ndedition, 1993.