BY OUT OF TECHNOLOGY AND THE OF TECHNOLOGY A		National Institute of Technology Meghalaya An Institute of National Importance										CURRICULUM			
Pro	gramm	e Minor degree in Sports Engineering Year of Regulation									2024				
	partmen										VI				
Сс	urse	Caura a Nama						Credit Structure					Marks Distribution		
С	ode	Course Name					L	Т	Р	С	IN	Т МІ	D	END	Total
ME362		Mechanical Design in Sports					2	0	2	3	50		-	100	200
		The students will able to understand and contextualize the role			CO1	Able to interpret the basic structure of Product Design, Product Development Process, a Development.						and Scope	of Product		
Course Objectives		of mecl	hanical and science in the		CO2		Able to demonstrate the basic knowledge of design methodologies, different considerations (aesthetic, ergonomic, manufacturing, safety, etc.), materials.								
		design equipmen	of sports	Course Outcomes	CO3		Able to demonstrate the various design processes, manufacturing considerations in design and related experiments.								
					CO4	Demons	Demonstrate the part design of mechanical systems using codes, simulation tools.								
					CO5	Able to	Able to justify the use of physical prototype in line with design for robustness								
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	-	-	-	2	-	-
2	CO2	3	2	2	-	2	-	-	2	-	-	-	2	-	-
3	CO3	3	2	2	-	2	-	-	2	-	-	-	2	-	-
4	CO4	3	2	2	-	2	-	-	2	-	-	-	2	-	-
5	CO5	3	2	2	-	2	-	-	2	-	-	-	2	-	-
6	CO6						0) (1.1	15110							
N.1	1							ABUS					Hours		
No.	Introdu	Content Introduction to Mechanical Design in Sports, Theories and Methodologies in sports goods and apparel Design, Product Develop										Develonment	Hours		COs
l			ls Selection for	•		s and wich	lodologies in s	ports good	s and app	parer Design	ii, Troduct 1	oc velopinem	э		CO1
II	system	Engineering Design Process, Factors influencing Design, Engineering Materials, Limits, Fits and Tolerances. Analysis of structural systems 1D(Beams), 2D (frames), Practical application of Buckling and instability (Euler and Johnson Buckling); Dynamics: Velocity, Acceleration and Inertia analysis, Fatigue: Stress Concentration factors, Goodman Diagram, Factor of Safety, Static/Dynamic Loading													CO2
III	Mecha	lechanical Systems in Sports: Study of mechanical systems in sports, Analysis of sports goods and apparels, Sports Equipment Designates as studies on mechanical innovations in sports.												4	
IV		Systems Approach to Design: Decision Making, Simulation of sports goods and apparels using CAD tools, Sensitivity analysis of designarameters, Value Analysis and Value Addition to designed components and systems.												4	
V		Physical Prototypes and Design for Robustness: Prototyping Essentials, Types of Prototypes, Uses of Prototypes, Rapid Prototyping Technique, Mathematical Modelling versus Physical Prototyping, Dimensional Analysis.												3	
VI															All COs
VII	Experimental Analysis: Compression test, hardness tests, Torsion test, Development of the model in modelling software and performance of 3D printing, scanning of an object and print through 3D Pinter, CAD modelling and simulation of sports goods.											24		All COs	
			<u>_</u>			Total L		-					10		

Essential Readings

- 1. J. E. Shigley, "Mechanical Engineering Design", McGraw Hill, 10th edition, 2014
- 2. Karl UIrich and Steven Eppinger, "Product Design and Development" 5th Edition, 2017

Supplementary Readings

- 1. A. H. Burr and J. B. Cheatham, "Mechanical Analysis and Design", 2nd Ed., Prentice Hall, 1997
- 2. V. B. Bhandari, Design of Machine Elements, 2nd Ed., Tata McGraw Hill, 2007
- 3. R. C Juvinall and K. M Marshek, Fundamentals of Machine Component Design, 3rd Ed., Wiley Student Edition, 2007

Total Hours

48