

As Per NEP 2020

University of Mumbai



Syllabus for Basket of OE	
Board of Studies in Biomedical Engineering	
UG First Year Programme	
Semester	III
Title of Paper	Basics of Biomedical Engineering
Credits	2
From the Academic Year	2024-25

Sr. No.	Heading	Particulars
1	Description the course:	Biomedical Engineering is a rapidly evolving field driven by the exponential growth of semiconductor industries and computer science. This course introduces fundamental concepts, techniques, and tools necessary to understand the body functions, involvement of organs, many kinds of diseases and methods to monitor the prognosis in patients. Students will explore real-world applications across various domains, including business, healthcare, social sciences, and finance. By analyzing case studies and learning about emerging trends, students will gain practical knowledge essential for leveraging data-driven decision-making. The course is designed for learners from diverse academic backgrounds, highlighting its interdisciplinary nature and relevance to multiple career paths.
2	Vertical :	Open Elective
3	Type :	Theory
4	Credit:	2 credits (1 Credit = 15 Hours for Theory or 30 Hours of Practical work in a Semester)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives: 1 To understand the anatomical structures and physiological processes of the human body. 2 To understand bio-electric signals and their recording. 3 To understand need for patient monitoring and continuous recording of vitals. 4 To understand need for life saving equipment's and get acquainted with their construction and working. 5 To understand basics of imaging equipments. 6 To understand basic concepts and theory related to statistics.	
8	Course Outcomes: Six Course outcomes 1. Learners will be able to explain the anatomical parts and physiological processes of important systems of human body. 2. Learners will be able to record bio-electric signal from the human body.	

	3. Learners will be able to acquire human vitals from patient in ICU. 4. Learners will be able to demonstrate working of the lifesaving instruments. 5. Learners will be able to explain construction and working of X-ray and Ultrasound. 6. The learner will be able to perform preliminary analysis of the medical data.
	Modules:
	Pre-requisites: Knowledge of living organisms, Basics of electrical and electronics circuits, Physics of sensors and measurements
	Module 1: Introduction to the Human Body : 5 Hours
	Cardiovascular system, Respiratory system, Nervous system, Special senses, Action potential
	Module 2: Bio-electric Signals : 5 Hours
	Electrocardiography, Leads, Normal and abnormal patterns
	Module 3: Patient monitoring instruments : 5 Hours
	Pulse rate, Oxygen saturation, Respiratory, Blood pressure and Temperature monitoring during intensive care.
	Module 4: Lifesaving instruments : 4 Hours
	Principle and working of cardiac pace maker and de-fibrillator
	Module 5: Basics of imaging
	Principle and working of X-ray, ultarsound and tomographic imaging
	Module 6: Data analysis: 3 Hours
	Descriptive statistics, Probability and sampling distributions, Hypothesis testing
10	Text Books: 1. Introduction to Biomedical Equipment Technology: Carr –Brown. (PH Pub) 2. Medical Instrumentation, Application and Design: J G. Webster. (John Wiley) 3. Biostatistics by Wayne W. Daniel, Seventh edition, Wiley India

11	References: 1. Principles of Applied Biomedical Instrumentation, Geddes & Baker, John Wiley 2. Christensen's Physics of Diagnostic Radiology, Thomas S. Curry, James E. Dowdey, Robert C. Murry. Wolters Kluwer, Fourth Edition 3. Physics of Diagnostic Imaging, David Dowsett, Patrick A Kenny, R Eugene Johnston. CRC Press, Second Edition.	
12	Internal Continuous Assessment: 40%	Semester End: 60%
13	Continuous Evaluation through: IAT-1 : 15 marks IAT-2: 15 marks Average of IAT-1 & IAT-2 = 15 marks. Projects, Presentation and assignments, (5 marks) etc.	Semester End Examination (30 marks) - Duration 1 hours.
14	Format of Question Paper: End-semester examination • Question Paper will comprise three questions each with 10 marks. All modules must be covered. All three questions need to be answered.	

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