

	L	T	P	
Introduction to Biomedical Engineering (BT315)	3	1	0	NIL

Course Objectives: The main goal of subject is to introduce students to the application of engineering science to biomedical problems and to apply basic principles of science and engineering to study living functions and to understand the operation of biomedical instruments.

Course Outcomes:

1. Distinguish between different types of roles of biomedical engineering and intro to anatomy and physiology of the human body.
2. Outline basics and principles of rehabilitation engineering.
3. Identify the basic bioinstrumentation system, design, and biomedical sensors.
4. Critically analyse different instrumentations and imaging devices like MRI, biomedical optical imaging.
5. Evaluate the molarity and ethics of biomedical engineering in FDA process.

S. No.	Contents	Contact Hours
1	Introduction to Biomedical Engineering, Roles Played by Biomedical Engineers, Professional Status of Biomedical Engineering. Introduction: Anatomy and Physiology, Cellular Organization, Tissues, Major Organ Systems and Homeostasis	8
2	Introduction: Rehabilitation Engineering and Assistive Technology, Principles of Rehabilitation Engineering, Introduction of Biomaterials in Medicine: From Prosthetics to Regeneration, Tissue-Biomaterial Interactions, Tissue Engineering	8
3	Introduction to basic Bioinstrumentation System, Bioinstrumentation Design, Introduction to Biomedical Sensors, Basic Biophysics, Equivalent Circuit Model for the Cell Membrane Hodgkin–Huxley Model of the Action Potential. Introduction to Origin, Characteristics and Acquisition of Biosignals	9
4	Instrumentation and Imaging Devices, Radiographic Imaging Systems, Introduction of Diagnostic Ultrasound Imaging, Magnetic Resonance Imaging (MRI), Biomedical Optical Imaging, Fundamentals of Light Propagation in Biological Tissue, Physical Interaction of Light and Physical Sensing, Biochemical Measurement Techniques Using Light, Fundamentals of Therapeutic Effects of Lasers	9

5	Biomedical Morality and Ethics: A Definition of Terms, Regulation of Medical Device Innovation Marketing Medical Devices, The Role of the Biomedical Engineer in the FDA Process.	8
	Total	42

Books: -

S. No.	Name of Authors /Books / Publishers
1.	R. S. Khandpur, Handbook of Bio-Medical Instrumentation, Tata McGraw Hill, India, 2005
2.	L.a. Geddes, L.e. Baker, Principles of Applied Biomedical Instrumentation, 3rd edn., Wiley India Pvt. Ltd, New Delhi,
3.	J. D. Bronzino, Biomedical Engineering & Instrumentation, CRC Publication, Boca Raton, FL
4.	A. C. Guyton and E. Hall, Textbook of Medical Physiology, 11th edn., Elsevier

Thermodynamics of Biological System

Details of course:-

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Thermodynamics of Biological System (BT317)	3	1	0	NIL

Course Objectives: To gain insight into the concepts of nonbiological and biological thermodynamic systems, how are membrane transport and various metabolic processes facilitated

Course Outcomes:

1. Compare nonbiological and biological thermodynamics systems.
2. The course familiarizes the students with the laws of thermodynamics.
3. Fabricate the chemical potential of the laws in biological state.
4. Explain non-equilibrium thermodynamics using Fick's law.
5. Evaluate thermodynamics in biological systems

S. No.	Contents	Contact
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