INDIAN INSTITUTE OF INFORMATION TECHNOLOGY DESIGN AND

MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	**Biosignal Processing and Analysis**	Course Code	EC5XXX			
Dept./ Specialization	ECE	Structure (LTPC)	3	1	0	4
To be offered for	UG/ PG	Status	Core ☐		Elective ■	
Faculty Proposing the course	Dr. Rohini. P	Type	New ☐		Modification ☐	
Recommendation from the DAC		Date of DAC	28/04/2022			
External Expert(s)						
Pre-requisite	Probability and Random Process Basic knowledge on MATLAB/ Python	Submitted for approval			48th Senate	
Learning Objectives	The students will get an overview of different biosignals that can be acquired from the human body. The course will also make the students equipped with tools for analysis of biosignals.					
Learning Outcomes	Upon completion of the course, the students will be able to 1. To learn the fundamental concepts of signal processing 2. To apply common signal processing techniques for various biomedical signals 3. Develop suitable process flow specific to the type of biosignal					
Contents of the course *(With approximate break-up of hours for L/T/P)*	**Module 1 - Introduction to Biosignals (6L/1T)** Electrical activities of the Cell, Action Potential, Nature of Biomedical Signals, Examples of Biosignals, Objectives and difficulties in Biosignal processing and analysis. **Module 2 - Cardiac signal processing (9L/4T)** Electrocardiogram: Origin of ECG, ECG Electrode Placement, ECG data acquisition, ECG lead system, ECG signal characteristics (parameters and their estimation), Role of ECG in diagnosis of Cardiovascular Diseases, Denoising, Processing and Feature Extraction of ECG (Case Study) - Time-Domain Analysis, Frequency-Domain Analysis, Wavelet-Domain Analysis, Classification (Case study). **Module 3 - Neural signal processing (9L/4T)** Electrophysiological origin of brain waves, EEG signal and its characteristics (EEG rhythms, waves, and transients), Evoked Potentials, Role of EEG in diagnosis of Central Nervous System disorders, Denoising, Processing and Feature Extraction of EEG (Case Study), Time- Domain Analysis, Frequency- Domain Analysis, Correlation Analysis of EEG Signal, Wavelet-Domain Analysis, Classification (Case study). **Module 4 - Myo-signal processing (9L/3T)** Electromyogram- Signal of Muscles, Significance of EMG, Neuromuscular Diseases and EMG, Denoising, Processing and Feature Extraction of EMG (Case Study) – Time, Frequency and Time-Frequency					

	Module 5 - Introduction to other biosignals (9L/2T) Blood Pressure and Blood Flow analysis, Photoplethysmogram signal processing and analysis, Electrooculogram and Electroretinogram signal analysis, Magnetoencephalogram, Respiratory Signals.
Text Book	1. Kayvan Najarian and Robert Splinter, "Biomedical Signal and Image Processing", Second Edition, CRC Press, 2005. 2. R M Rangayyan "Biomedical Signal Analysis: A case Based Approach", IEEE Press, John Wiley & Sons. Inc, 2002
Reference Books	1. Willis J. Tompkins "Biomedical Digital Signal Processing", EEE, PHI, 2004 2. D C Reddy "Biomedical Signal Processing: Principles and Techniques", Tata McGraw-Hill Publishing Co. Ltd, 2005 3. J G Webster "Medical Instrumentation: Application & Design", John Wiley & Sons Inc., 2001