Course Code: **ELX DLO5014**

Subject Name: BIOMEDICAL INSTRUMENTATION

Academic Term: ***JULY 2018-NOVEMBER 2018***

Course Outcomes:

Upon completion of this course students will be able to:

ELX DLO5014.1 Explain the generation of various Bio-potentials and their specifications in terms of amplitude and frequency.
ELX DLO5014.2. Explain various physiological systems and related measurements.
ELX DLO5014.3. Describe the design considerations of various Biomedical Instruments used for diagnostic applications

ELX DLO5014.4. Describe various imaging techniques and their applications

Mapping of CO with PO/PSO:

	PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
ELX DLO5 014.1	3													
ELX DLO5 014.2	3		3				1							
ELX DLO5 014.3	3		2			2								
ELX DLO5 014.4	3		2			2								
Course	3		2.33			2	1							

Mapping of CO with PO with Justification

ELX DLO5014.1	**PO1**	Apply the knowledge of science and engineering fundamentals, and an engineering specialization for concepts related to generation of bio-potentials.

ELX DLO5014.2	**PO1**	Apply the knowledge of science and engineering fundamentals, and an engineering specialization for understanding physiological systems and measurements
	PO3	Design solutions for biomedical signal measurements meet the specified needs with appropriate consideration for public health and safety
	PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
ELX DLO5014.3	**PO1**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for design of various Biomedical Instruments used for diagnostic applications
	PO3	Design solutions for biomedical signal acquisitions and analysis
	PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in the design of various biomedical instruments
ELX DLO5014.4	**PO1**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for understanding various imaging techniques and their applications
	PO3	Design solutions for various imaging techniques used in biomedical measurements
	PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in imaging

Contribution to outcomes will be achieved through content delivery:

Modes of delivery

Modes of Delivery	**Brief description of content delivered**	**Attained COs**	**Attained POs**
Class room lectures	Bio-Potential and Measurement Physiological Systems and Related Measurement Cardiovascular Measurement Life support Instruments Imaging Techniques Significance of Electrical Safety	ELX DLO5014.1, ELX DLO5014.2, ELX DLO5014.3, ELX DLO5014.4	PO1,PO3 PO6
Online Videos	Physiological Systems and Related Measurement Cardiovascular Measurement	ELX	PO1,PO3

	Life support Instruments Imaging Techniques	DLO5014.2, ELX DLO5014.3, ELX DLO5014.4	PO6

CO Assessment Tool

Course Outcome	***Assessment Method***							
	Direct Method (80 %)							***Indirect Method (20%)***
	Unit Tests		Assignments		Semi nars	Quizzes	End Semester Exam	Course Exit Survey
	1	2	1	2				
ELX DLO5014.1	20%	-	20%	-	-	10%	50%	100%
ELX DLO5014.2	10%	20%	10%	-	-	10%	50%	100%
ELX DLO5014.3	10%	10%	10%	10%	10%	-	50%	100%
ELX DLO5014.4	-	30%	-	20%	-	-	50%	100%

Rubrics for assessing Course Outcome CO1, CO2 and CO3,CO4 with each assessment tool:

Rubrics			
Assignment	Timeline	Completeness	Level of Depth

Laboratory	Timeline	Level of understanding	Originality
Case Studies	Timeline	Level of understanding	Presentation

Submitted By	**Approved By**
Dr. Sapna Prabhu	ii) Prof. K. Narayanan Sign:
Sign:	ii) Dr. Sapna Prabhu Sign:
	iii) Prof. Shilpa Patil Sign:
	iv) Prof. Monica Khanore Sign:
Date of Submission:	**Date of Approval:**
Remarks by PAC (if any)	