

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY  
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	<b>Medical Electronics</b>	Course Code	EC51XX			
Dept./ Specialization	Electronics & Communications	Structure (LTPC)	3	1	0	4
To be offered for	UG/PG	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Faculty Proposing the course	Dr. S. Kalpana	Type	New <input checked="" type="checkbox"/>		Modification <input type="checkbox"/>	
Recommendation from the DAC		Date of DAC				
External Expert(s)	(1) Dr. V V Raghavendra Sai, Associate Professor, Applied Mechanics, IITM, India (2) Dr. Jang-Zern Tsai, Associate Professor, Electrical Engineering, National Central University, Taiwan					
Pre-requisite	Basic Knowledge in Electronics	Submitted for approval			49 <sup>th</sup> Senate	
Learning Objectives	The key objective of this course is to explore the key applications of electronic devices and the theory of operation in the medical field					
Learning Outcomes	<p>On successful completion of this course, the students should be able to</p> <ul style="list-style-type: none"> <li>• Perform electrical and non-electrical physiological measurements</li> <li>• Interface electronics and biological systems</li> <li>• Develop electronic devices for practical applications</li> </ul>					
Contents of the course (With approximate break-up of hours for L/T/P)	<p><b>Introduction to Electrophysiology:</b> Bioelectric Potential, Bioelectrodes - Surface Electrodes and Microelectrodes &amp; their selection for biomedical applications, Biopotential Recording - Electrocardiography - standard lead systems - ECG Instrumentation Amplifier, <b>Medical Isolation Amplifiers, Electrical Safety</b> (L9+T3)</p> <p><b>FET-based Bioelectronic Devices:</b> Biosensor Overview, Transducers - Characteristics, <b>Impedance-based Systems</b>, Ion Sensitive Field Effect Transistor, Enzyme Field Effect Transistor, Neurochip - Electrolyte-Oxide-Semiconductor Field Effect Transistors (L10+T3)</p> <p><b>Implantable Electronic Devices:</b> Wireless Power and Data Transmission, Inductive, RF and Optical links, Safety and Biocompatibility, Pacemakers, Cochlear implants, Brain stimulators, Retinal implants (L8+T3)</p> <p><b>Soft Electronics:</b> E-skin and Wearable Systems for Health Care, Flexible/stretchable Sensor Devices, Functional/active Materials, Electronic Textiles (L6+T2)</p> <p><b>Recent Trends in Medical Electronics:</b> Internet of Medical Things (IoMT), Lab-on-a-chip (LOC), Electronic Nose (e-nose), Nanomedicine (L6 + T2)</p> <p><b>Case studies</b> on biophysical signal acquisition (L3+T1)</p>					
Text Book	<ol style="list-style-type: none"> <li>1. "Introductory Bioelectronics: For Engineers and Physical Scientists", Ronald R. Pethig and Stewart Smith, ISBN: 978-1-118-44328-6, John Wiley &amp; Sons, 2012.</li> <li>2. "Medical Instrumentation Application and Design, 5th Edition", John G. Webster and Amit J. Nimunkar, ISBN: 978-1-119-45733-6, John Wiley &amp; Sons, 2020.</li> <li>3. "Implantable Bioelectronics", Evgeny Katz, ISBN: 978-3-527-67316-2, John Wiley &amp; Sons, 2014.</li> </ol>					
Reference Books	<ol style="list-style-type: none"> <li>1. "Handbook of Bioelectronics", Sandro Carrara and Krzysztof Iniewski, ISBN: 9781139629539, Cambridge University Press, 2015.</li> <li>2. "Handbook of Biomedical Instrumentation, 3rd Edition", R S Khandpur, ISBN: 978-9339205430, McGraw Hill Education, 2014.</li> </ol>					