

## Annexure 'G'

### INDIAN INSTITUTE OF INFORMATION TECHNOLOGY DESIGN AND MANUFACTURING (IIITD&M) KANCHEEPURAM

Course Title	Mechatronic Systems Design	Course No			
Specialization	Electronic Engineering	Structure (IPC)	3	0	3
Offered for	UG/PG	Status	Core <input type="checkbox"/>	Elective	<input checked="" type="checkbox"/>
Pre-requisite	Basic familiarity with circuits and electronics; C programming	To take effect from	July 2015		
Objectives	To provide a hands-on introduction to the components of electromechanical systems, namely sensors, actuators, interfaces, computer hardware, and control software, and enable understanding of the theory and practice of mechatronic systems integration.				
Course Outcomes	<p>At the end of the course, the students shall be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic concepts of the main sensors used in electromechanical systems</li> <li>2. Understand the fundamental concepts of mechanical power transmission components, and pneumatic and hydraulic actuators</li> <li>3. Use the common analog and digital interfaces between sensors/actuators and the systems under control using open source microcontrollers</li> <li>4. Understand the integration of mechanisms, sensors, actuators, interfaces and software in the design of mechatronic systems</li> </ol>				
Contents of the course  <i>(With approximate break up of hours)</i>	<p>Introduction: Mechatronics, history, applications, and trends (1)</p> <p>Sensors and transducers: Characterization, sensors for position, velocity, proximity, force, pressure, temperature and light (4)</p> <p>Signal conditioning: Amplification, filtering, multiplexing, and telemetry. Data acquisition with A/D, D/A and digital I/O (5)</p> <p>Mechanical components: Types of motion, kinematic chains, cams, gears and other power transmission mechanisms (3)</p> <p>Software development: program structures for embedded systems, software design process, inter-processor communication, microcontroller peripherals (6)</p> <p>Pneumatic and hydraulic actuators: Basics of fluid flow, control valves, cylinders and rotary actuators for pneumatics and hydraulics (5)</p> <p>Microcontrollers: Introduction to use of open source microcontrollers (Arduino, Raspberry Pi, and BeagleBone), shields for GPS, GPRS/GSM, Bluetooth, RFID, and Xbee, integration with wireless networks, databases and web pages(9)</p> <p>Basic closed-loop control: open-loop, on-off, PID control, introduction to programmable logic controllers (5)</p> <p>Mechatronic systems integration, rapid prototyping of mechanical and electrical systems [4]</p>				
Text and References	<p><b>TEXTBOOK:</b></p> <ol style="list-style-type: none"> <li>1. J. Edward Carryer, Matthew Ohline, and Thomas Kenny, Introduction to Mechatronic Design, 1<sup>st</sup> edition, Prentice Hall, 2010, ISBN 978-0131433564</li> </ol> <p><b>REFERENCE BOOKS:</b></p> <ol style="list-style-type: none"> <li>1. W. Bolton, Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 4<sup>th</sup> Edition, Pearson India, 2010, ISBN 978-8131732533.</li> <li>2. David G. Alciatore and Michael B. Hstand, Introduction to Mechatronics and Measurement Systems, 4<sup>th</sup> Edition, McGraw Hill Indian Edition, 2014, ISBN-13: 978-9339204365.</li> </ol>				