

Course Title	<b>Foundations of IoT</b>	Course No				
Department/ Specialization	ECE	Credits	L	T	P	C
			3	0	1	4
Faculty proposing the course	Premkumar K., Department of ECE	Status	Core ■	Elective ■		
Offered for	B.Tech and MTech	Type	New ■	Revision □		
To take effect from		Submitted for approval	____ Senate			
Prerequisite	Nil					
Learning Objectives	<ul style="list-style-type: none"> <li>To introduce the basic architecture of Internet of Things and various IoT protocols.</li> <li>To build simple IoT applications using Arduino and Raspberry Pi.</li> <li>To introduce data analytics in the context of IoT</li> </ul>					
Learning Outcomes	<p>Students are expected to</p> <ul style="list-style-type: none"> <li>- Understand the concepts of IoT Architecture Reference model</li> <li>- Analyze various IoT Application layer Protocols.</li> <li>- Design IoT-based systems for real-world problems.</li> </ul>					
Course Contents (with approximate breakup of hours for lecture/ tutorial/practice)	<ul style="list-style-type: none"> <li><b>IoT Architectures:</b> oneM2M, IoT World Forum (IoTWF), Simplified IoT Architecture, Core IoT Functional Stack, <b>IoT Data Management</b> - Fog, Edge and Cloud in IoT <b>Functional blocks</b> of an IoT ecosystem - Sensors, Actuators, Smart Objects and Sensor Networks (L9 hrs)</li> <li><b>IoT Access Technologies:</b> Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN (L8 hrs)</li> <li><b>Network Layer:</b> IP versions, Constrained Nodes and Constrained Networks - Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks (L8 hrs)</li> <li><b>Application Protocols:</b> Supervisory Control and Data Acquisition - Application Layer Protocols: CoAP and MQTT (L8 hrs)</li> <li><b>Cisco IoT system</b> - IBM Watson IoT platform - Manufacturing - Converged Plantwide Ethernet Model (CPwE) - Power Utility Industry - GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control (L9 hrs)</li> <li><b>Hands-on in IoT:</b> Projects based on some Hardware (Raspberry pi, Arduino, Intel, IITH Mote, Smartphones), Software (Contiki, TinyOS, Android), IoT Fabricator (<b>P 2hrs per week</b>)</li> </ul>					
Essential Reading	1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, –IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017.					
Supplementary Reading	<ol style="list-style-type: none"> <li>Olivier Hersent, David Boswarthick, Omar Elloumi , –The Internet of Things - Key applications and Protocols, Wiley, 2012 (for Unit 2).</li> <li>Jan Ho" ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.</li> <li>Vijay Madiseti , Arshdeep Bahga, Internet of Things (A Hands-on-Approach), 2014.</li> </ol>					