Course Code	21CSE429T	Course Name	DATA SCIENCE FOR INTERNET OF THINGS	Course Category	E	PROFESSIONAL ELECTIVE	L	T	P	C
							2	1	0	3

Pre-requisite Courses	*Nil*	Co- requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*School of Computing*	**Data Book / Codes / Standards**		*Nil*	

Course Learning Rationale (CLR):	***The purpose of learning this course is to:***
CLR-1:	*learn the basics of IoT analytics and the challenges involved in design of IoT*
CLR-2:	*understand the devices, protocols and standards involved in IoT systems*
CLR-3:	*learn various real-world systems involving IoT sensor*
CLR-4:	*explore the smart applications development using IoT sensors and systems*
CLR-5:	*identify the possible applications in healthcare using IoT sensors and the IoT data analytics in this domain*

Course Outcomes (CO):	***At the end of this course, learners will be able to:***	**Program Outcomes (PO)**												**Program Specific Outcomes**		
		1	2	3	4	5	6	7	8	9	10	11	12			
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
CO-1:	*identify the challenges involved in the design of IoT Analytics systems*	-	-	-	-	-	-	-	-	-	-	-	-	-	*1*	-
CO-2:	*understand the internals of IoT devices and the sensor networks*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*2*
CO-3:	*design IoT Sensor networks for various real-world applications*	-	-	-	-	-	-	-	-	-	-	-	-	-	*2*	-
CO-4:	*develop smart applications using IoT sensors and analyse the data received from them*	-	-	-	-	-	-	-	-	-	-	-	-	*2*	-	-
CO-5:	*implement IoT healthcare systems and IoT Healthcare data analytical systems*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*2*

Unit-1 - Defining IoT Analytics and Challenges	***9 Hour***
The situation - Defining IoT analytics - Defining analytics - Defining the Internet of Things - The concept of constrained - IoT analytics challenges - The data volume - Problems with time - Problems with space - Data quality - Analytics challenges - Business value concerns	
Unit-2 - IoT Devices, Networking Protocols and Standards for Internet of Things	***9 Hour***
IoT Devices-Healthcare-Manufacturing-Transportation and logistics-Retail-Oil and gas- - Home automation or monitoring - Wearables - Sensor types-IoT Data Link Protocols-Network Layer Routing Protocols - Network Layer-Encapsulation Protocols -Session Layer Protocols-IoT Management Protocols-Security in IoT Protocols-IoT Challenges	
Unit-3 - IoT Sensing, Mobile and Cognitive Systems	***9 Hour***
Sensing Technologies for Internet of Things - IoT Interactions with GPS, Clouds and Smart Machines - Radio Frequency Identification (RFID) - Sensors, Wireless Sensor Networks and GPS Systems - Cognitive Computing Technologies and Prototype Systems – Problems	
Unit-4 - Smart Applications IoT with Data Analytics	***9 Hour***
Defragmenting Intelligent Transportation: A Practical Case Study -Connected and Autonomous Vehicles-Transit Hub: A Smart Decision Support System for Public Transit Operations – Smart Home Services Using the Internet of Things	
Unit-5 - Case Studies in IoT Healthcare	***9 Hour***
Big Data Analytics for Healthcare and Cognitive Learning - Machine Learning for Big Data in Healthcare Applications - Healthcare Problems and Machine Learning Tools - IoT-based Healthcare Systems and Applications, Emotional Insights via Wearables- Structural Health Monitoring-Home Healthcare and Remote Patient Monitoring	

Learning Resources	1. *Analytics for the Internet of Things (IoT) by Andrew Minteer, Released July 2017, Publisher(s): Packt Publishing, ISBN: 9781787120730.* 2. *Big-Data Analytics for Cloud, IoT and Cognitive Computing, Kai Hwang, Min Chen, ISBN: 978-1-119-24729-6 March 2017.* 3. *Internet of Things and Data Analytics Handbook,Hwaiyu Geng (Editor) - ISBN: 978-1-119-17364-9 January 2017*	4. *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* 5. *Arshdeep Bahga, Vijay Madisetti, Internet of Things – A hands-on approach, Universities Press, 2015*

Learning Assessment

	Bloom's Level of Thinking	*Continuous Learning Assessment (CLA)*				*Summative Final Examination (40% weightage)*	
		Formative CLA-1 Average of unit test (50%)		*Life-Long Learning CLA-2 (10%)*			
		Theory	*Practice*	*Theory*	*Practice*	*Theory*	*Practice*
Level 1	*Remember*	*40%*	-	*20%*	-	*40%*	-
Level 2	*Understand*	*40%*	-	*20%*	-	*40%*	-
Level 3	*Apply*	*10%*	-	*20%*	-	*10%*	-
Level 4	*Analyze*	*10%*	-	*20%*	-	*10%*	-
Level 5	*Evaluate*	-	-	*10%*	-	-	-
Level 6	*Create*	-	-	*10%*	-	-	-
	Total	*100 %*		*100 %*		*100 %*	

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
	1. *Dr.I.Joe Louis Paul, Associate Professor, SSN College of Engineering*	1. *Dr K.Shantha Kumari, SRMIST*