



# AMITY UNIVERSITY KOLKATA

## COURSE CURRICULUM

**Course Title: Internet of Things: Sensing and Actuator Devices**

**Credit Units:4**

**Course Level: UG**

**Course Code: CSE449**

L	T	P/ S	SW/ FW	No. of PS DA	TOTAL CREDIT UNITS
3	0	2	0	0	4

### Course Objectives:

The course objectives are to provide an overview of concepts, main trends and challenges of Internet of Things. Develop the ability to use Internet of Things related software and hardware technologies. To provide the knowledge of data management business processes and analytics of IoT

### Pre-requisites:

Data Communication and Computer networks

### Course Contents/Syllabus:

	Weightage (%)
<b>Module I Introduction to Internet of Things</b> <b>Descriptors/Topics</b> Definition of Internet of Things (IoT), IoT Paradigm, IoT Architecture – State of the Art, IoT Protocols, IoT Communication Models	20%
<b>Module II Challenges in IoT</b> <b>Descriptors/Topics</b> Design challenges, Development challenges, Security challenges, Other challenges, IoT in Global Context, Real world scenarios, Different Areas, Examples Trends in the Adaption of the IoT (Cloud Computing, Big Data Analytics, Concepts of Web of Things, Concept of Cloud of Things with emphasis on Mobile Cloud Computing, Smart Objects).	20%
<b>Module III Network &amp; Communication aspects</b> <b>Descriptors/Topics</b> Brief study of Protocols used in Network Layer, Transport Layer and Application Layer such as: IEEE 802.11(WLAN), ZigBee, MQTT, CoAP, IPV4 and IPv6, UDP, TCP, SNMP  Wireless medium access issues, Sensor deployment & Node discovery, Data aggregation & dissemination, Identification	20%

resource/service discovery.	
<b>Module IV Sensors</b>	<b>20%</b>
<b>Descriptors/Topics</b> Introduction to different IoT tools, Implementing IoT concepts with python, Selection of Sensors for Practical Applications Developing different applications through IoT tools, Developing sensor based application platform,	
<b>Module V Miscellaneous Applications</b>	<b>20%</b>
<b>Descriptors/Topics</b> Monitoring and actuating, Introduction of Different Types of Sensors such as Capacitive, Resistive, Surface Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas ,Business Process and Data Analysis, IoT and the Cloud.	

### Student Learning Outcomes:

1. Explain and interpret the Internet of Things concepts and challenges.
2. Identify data management and business processes and analytics of IoT
3. Design and develop small IoT applications to create smart objects

### Pedagogy for Course Delivery:

The class will be taught using audio-visual aids and problem based method. In addition to assigning the problems, the course instructor will spend considerable time in understanding the concept of innovation through the eyes of the industry. The instructor will cover the ways to think innovatively liberally using thinking techniques.

### Lab/ Practicals details, if applicable:

#### List of Experiments:

1. To implement the types of topologies such as Star, Hub, Mesh and Bus using Cisco Packet Tracer
2. To implement the Wireless and Wired Networks and understand the OSI layer model using Cisco Packet Tracer
3. To implement the configuration of Routers, Switches and Hubs using Cisco Packet Tracer
4. To implement the Inter VLAN Routing using Cisco Packet Tracer
5. To implement the virtual private network (VPN) using Cisco Packet Tracer
6. To implement the Temperature sensor interfacing using Arduino UNO
7. To implement the Pressure sensor interfacing using Arduino UNO
8. To implement the Light Sensor interfacing using Arduino UNO
9. To implement the LED blink using the Raspberry Pi
10. To implement the Motion Sensor using the Raspberry Pi

**List of Professional Skill Development Activities (PSDA):**

NA

**Assessment/ Examination Scheme:**

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75	25	100

**Theory Assessment (L&T):**

ContinuousAssessment/InternalAssessment 30%					End Term Examination 70%
Components(Dropdown)	Attendance	ClassTest	Assignment	CaseStudy	
Weightage(%)	5	10	7	8	70

**Lab/ Practical/ Studio Assessment:**

	Continuous Assessment/Internal Assessment (_40 %)				End Term Examination (60 %)		
Components (Drop down)	Attendance	Lab Experiment	Lab Record	Viva	Practical	Viva	Total
Weightage (%)	5	10	15	10	30	30	60

**Text Reading:**

- The Internet of Things (MIT Press) by Samuel Greengard.
- The Internet of Things (Connecting objects to the web) by Hakima Chaouchi (Wiley Publications).
- Internet of Things ( A Hands-on-Approach) by Arshdeep Bhaga and Vijay Madiseti.

**References:**

- The Internet of Things Key applications and Protocols, 2nd Edition, (Wiley Publication) by Olivier Hersent, David Boswarthick and Omar Elloumi.
- IoT –From Research and Innovation to Market development (River Publication) by Ovidiu Vermesan and Peter Friess.
- Building Internet of Things with Arduino by Charalampos Doukas.
- Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies & Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024', Yole Development Copyrights ,2014
- Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015
- Editors OvidiuVermesan Peter Friess,'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
- N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.