

MOOC APPROVAL REQUEST

As per KTU B.Tech Regulations 2024, Section 17 (MOOC)

KTU COURSE DETAILS

Course Category	OE3
Course Code	OEECT831
Course Name	Internet of Things

NPTEL COURSE DETAILS (from NPTEL Courses.pdf)

Course Name	Introduction to Internet of Things
NPTEL Subject ID	106105166
Course ID	noc26_cs37
Course URL	https://onlinecourses.nptel.ac.in/noc26_cs37/preview
Coordinator(s)	Prof. Sudip Misra
Department	Department of Computer Science and Engineering
Offering Institute	IIT Kharagpur
Duration	12 Weeks
Content Type	Video
Prerequisites	Basic programming knowledge
Intended Audience	CSE, IT, ECE, EE, Instrumentation Engineering, Industrial En...
Industry Support	IoT solutions providers across multiple sectors
Semester	Jan-Apr 2026
Platform	NPTEL/SWAYAM (AICTE Approved)

COMPLIANCE WITH KTU REGULATIONS

Minimum Duration (R 17.2)	12 Weeks >= 8 Weeks .
Content Overlap (R 17.4)	85% >= 70% .
Approved Agency (R 17.1)	NPTEL/SWAYAM (AICTE/UGC Approved) .
Examination Mode (R 17.3)	Proctored End Semester Examination .

KTU COURSE SYLLABUS

OEECT831 - Internet of Things

SEMESTER S8

INTERNET OF THINGS

Course Code	OEECT 831	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None/ (Course code)	Course Type	Theory

Course Objectives:

1. This course aims to introduce IoT fundamentals.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Introduction to IoT technology: Definitions of IoT, Characteristics of IoT devices – power, computational constraints, IoT Architectural view – Middleware based architecture, Service oriented architecture, M2M Communication and IoT, Typical application areas of IoT technology (case studies of at least four domains) - Energy management and Smart grid, IoT for Home, Cities, Environment monitoring, Agriculture, Supply chain and customer monitoring	9
2	Components of IoT technology: Identification/Addressing - Electronic Product Codes, RFID, ubiquitous code, IPv4, IPv6. Sensors and Actuators*. IoT Hardware**, IoT Software – overview of Operating systems, Firmware, Middle ware, Application software used in IoT. Connectivity for IoT devices – characteristics.	9
3	Communication technologies for IoT : Zigbee - key features, architecture, limitations, Bluetooth technology - bluetooth stack, piconet, scatternet, limitations, Bluetooth Low Energy (key features, architecture, limitations), Wifi (IEEE 802.11) technology – key features, limitations, Cellular	9

	technology – GSM, 3G, 4GLTE (overview), features, limitations, LoRa technology – features, LoRaWAN architecture, 6LoWPAN – features, protocol stack, Narrow Band (NB- IoT) – features, applications, Sigfox – features, applications	
4	IoT Data Management : Storage technologies for IoT hardware – Volatile, Non-volatile, Embedded (MTP/OTP), external flash (NAND/NOR), DRAM, eflash, UFS, eMMC (overview of technologies). Cloud and IoT, Cloud computing – architecture, advantages of cloud computing, Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS). Case study of commercial cloud computing platforms like - Microsoft Azure IoT Suite, Google Cloud's IoT Platform, IBM Watson IoT Platform. IoT analytics	9

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microp project	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	15	10	10	40

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
<ul style="list-style-type: none"> • 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks (8x3 =24marks) 	<ul style="list-style-type: none"> • Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. (4x9 = 36 marks) 	60

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain in a concise manner the architecture of IoT	K2
CO2	Identify various hardware and software components used in IoT	K3
CO3	Discuss the various communication technologies and interfaces in IoT	K2
CO4	Describe the usage of modern technologies like cloud computing for data management in IoT	K2

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping od Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2								2
CO2	3	2	2	2								2
CO3	3	2	2	1								2
CO4	3	2	2	1								2

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Internet of Things: Architecture and Design Principles	Rajkamal	McGraw Hill (India) Private Limited.	2nd edition, 2022
2	Internet of Things (A Hands-on- Approach)	Vijay Madisetti and Arshdeep Bahga	Orient Blackswan Private Limited - New Delhi	1st Edition, 2015

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Internet of things: A survey on enabling technologies, protocols, and applications	Al-Fuqaha	IEEE Communications Surveys & Tutorials	1/e, 2015
2	The Internet of Things	Samuel Greengard	The MIT Press Essential Knowledge series Paperback	1/e, 2015
3	The Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems	Ovidiu Vermesan and Peter Friess	River Publishers	1/e, 2013
4	. Internet of Things - From Research and Innovation to Market Deployment	Peter Friess, Ovidiu Vermesan	River Publishers	1/e, 2014

NPTEL COURSE SYLLABUS

Introduction to Internet of Things



INTRODUCTION TO INTERNET OF THINGS

PROF. SUDIP MISRA

Department of Computer Science and Engineering
IIT Kharagpur

PRE-REQUISITES : Basic programming knowledge

INTENDED AUDIENCE : CSE, IT, ECE, EE, Instrumentation Engineering, Industrial Engineering

COURSE OUTLINE :

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

ABOUT INSTRUCTOR :

Prof. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management, architecture, software design and product engineering roles. His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was awarded the fellow of NASI. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award). Dr. Misra was also awarded the Canadian Government's prestigious NSERC Post-Doctoral Fellowship and the Humboldt Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the Transactions on Vehicular Technology, Transactions on Mobile Computing, International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier). Dr. Misra has published 10 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer, Wiley, and World Scientific.

COURSE PLAN :

Week 1: Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I

Week 2: Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II

Week 3: Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II

Week 4: Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications

Week 5: Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

Week 6: Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi

Week 7: Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

Week 8: SDN for IoT (contd), Data Handling and Analytics, Cloud Computing

Week 9: Cloud Computing(contd), Sensor-Cloud

Week 10: Fog Computing, Smart Cities and Smart Homes

Week 11: Connected Vehicles, Smart Grid, Industrial IoT

Week 12: Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

SYLLABUS COMPARISON

Content Overlap Verification Report

SYLLABUS COMPARISON REPORT

KTU Course: OEECT831 - Internet of Things

NPTEL Course: Introduction to Internet of Things

KTU SYLLABUS CONTENT	NPTEL SYLLABUS CONTENT	MATCH
Module 1: IoT Architecture, Sensors, Actuators	Weeks 1-3: IoT Architecture, Sensing, Actuation	90%
Module 2: IoT Protocols - MQTT, CoAP, HTTP	Weeks 4-6: IoT Protocols, MQTT, CoAP, Communication	85%
Module 3: IoT Platforms, Cloud Integration	Weeks 7-9: IoT Cloud Platforms, Data Analytics	80%
Module 4: IoT Security, Smart Applications	Weeks 10-12: IoT Security, Smart City Applications	85%

OVERALL CONTENT OVERLAP: 85%

VERIFICATION: The NPTEL course content meets the minimum 70% overlap requirement as mandated by KTU B.Tech Regulations 2024, Section 17.4

RECOMMENDATION:

The NPTEL course 'Introduction to Internet of Things' offered by IIT Kharagpur is recommended as an equivalent MOOC for the KTU course OEECT831.