

ID810 ICT Tools for Designing Sustainable Solutions 2-0-1 3

Introduction to Internet of Things (IoT) systems and its applications - Case study based approach

IoT systems: Introduction to existing IoT systems, IoT Devices such as Raspberry Pi, Arduino, Waspote, Understanding tradeoffs, IoT Devices vs. Computers, Trends in the Adoption of IoT, Societal Benefits of IoT,

Building IoT Solutions: Programming IoT Devices using Python: Introduction to Python programming. Python Programming Environment, Python Expressions, Strings, Functions, Function Arguments, Lists, List Methods, Control Flow for data collection and processing.

Building Geographical Information Systems: introduction to GIS, geospatial data collection, mapping and processing

Developing sustainable solutions using IoT and GIS: Introduction to geospatial data collection tools, sensor data acquisition, tools for pre-filling form data, capturing distributed geolocation and events, exporting spatial and temporal data into different formats, tools for accepting e-payments, processing and visualization of the spatial and temporal data

Discussion of recent research papers of IoT Applications in sustainable development.

Objective:

- To develop an ability towards logical thinking and problem solving
- To develop an ability to do computer programming
- Familiarise the tools for data collection and data analysis
- To understand the importance of developing sustainable solutions

Course Delivery:

PowerPoint presentations, readings, recorded videos, Interaction, Lab sessions

Sessions and Topics:

Unit	Session	Topics
Unit 1	1-2	Introduction to IoT Systems - IoT Systems, Applications, Architectural components
	3-4	IoT Devices Familiarization of IoT Devices, Arduino, Waspote
Unit 2	5-7	Programming IoT Devices - Introduction to python programming

	8 -14	Lab Session
	15-18	Python Expressions, Strings, Functions, Function Arguments
	19-24	Lab Session
	25-29	Lists, List Methods, Control Flow for data collection and processing
	30-35	Lab Session
Unit 3	36-40	GIS Applications. Geospatial data collection and mapping techniques
	41-44	Developing sustainable solutions using IoT and GIS: Introduction to geospatial data collection tools, sensor data acquisition, tools for pre-filling form data, capturing distributed geolocation and events, exporting spatial and temporal data into different formats, tools for accepting e-payments, processing and visualization of the spatial and temporal data
	45-55	Case Study

Textbook/Reference:

1. ArsheepBahga, Vijay Madiseti, “internet of Things: A Hands-On Approach”, Universities Press
2. Mark Lutz, “Learning Python: Powerful Object-Oriented Programming: 5th Edition”, O’REILLY, 2013

Other major references:

- Recent research papers from ACM/IEEE/Springer
- <https://zapier.com/learn/forms-surveys/best-data-collection-apps/>
- <https://www.devicemagic.com/>

- <https://www.fulcrumapp.com/>
- <https://www.magpi.com/>
- <https://www.fastfieldforms.com/>
- <https://www.jotform.com/>

Course Outcomes:

CO1: Understand the basic concepts of python programming and OOP concepts.

CO2: Understand the concepts of IoT systems and its importance in real-world applications for sustainable development.

CO3 Programming IoT devices

CO4: Familiarisation of various data collection platforms for smart field survey

CO5: Understanding the research challenges and societal challenges for solving a real-world problem

CO6: Prototype design of IoT systems for sustainable development

Evaluation Policy

Internal			External		Total
<i>Components</i>	<i>Weightage</i>			Online Exam – 10%	Internal + External=100
Mid term	20%	online -10%	70%	30%	
		Viva – 10%			
Continuous assessment	50%	Lab Assignments – 20%	Viva – 20%		
		Term Project – 20%			
		Course Viva – 10%			