Course Code	Course Title	L	T	P	C
BECE352E	IoT Domain Analyst	1	0	2	2
Pre-requisite	NIL	Syllabus version			
		1.0			

Course Objectives

1. To explore the fundamentals and processing of data in IoT systems.
2. To equip the students with various machine learning techniques used in IoT analytics.
3. To impart knowledge on IoT-Cloud convergence and its computations.
4. To personalize an existing IoT architecture and evaluate cost functions based on the specific needs.

Course Outcomes

1. To apply the knowledge of using different data models and their relationships to develop IoT solutions.
2. To analyze the data preprocessing techniques and EDA techniques to convert data into insights.
3. To solve the real-world problems with IoT using machine learning models and cloud computing.
4. To choose specific personalization for the existing IoT architecture.
5. To evaluate the cost functions, assets and reusability plans of IoT solutions.

Module:1	**Data Models**	**2 hours**
SDLC, Development Models – Waterfall, Rapid Application Development, Agile Spiral Models, Object-Relational databases, Database models.		
Module:2	**Data Preprocess and EDA**	**2 hours**
Data Cleaning, Data Integration, Data Transformation, Data Reduction, Significance of Exploratory Data Analysis, Making sense of Data.		
Module:3	**ML & Cloud Computing for IoT**	**2 hours**
Supervised and Unsupervised ML Algorithms, IoT Data Analytics, Cloud Computing for IoT, Cloud Based platforms, ML for Cloud IoT Analytics, Challenges.		
Module:4	**IoT-Cloud Convergence**	**2 hours**
Opportunities and Challenges, Architectures for convergence, Data offloading and computation, Dynamic Resource Provisioning, Security Aspects.		
Module:5	**Smart Computing over IoT-Cloud**	**2 hours**
Cognitive Computing Capabilities, Underlying Technologies, Empowering Analytics, Deep Learning Approaches – Algorithms, Methods and Techniques		
Module:6	**User-Centric IoT Architecture**	**2 hours**
Enabling Technologies, Personalizing the IoT, User Sensitized IoT Architecture, Tweaked Data Layer, Personalization Layer.		
Module:7	**Value Engineering and Analysis**	**1 hours**
Principles and Phases of Value Engineering and Analysis in IoT Solutions, Cost-Function Analysis in IoT Solutions, Assets for IoT Solution Development, Reusability Plans		
Module:8	**Contemporary Issues**	**2 hours**
	Total Lecture hours:	**15 hours**

Text Books

1. Saleem, Tausifa Jan, and Mohammad Ahsan Chishti. "Big Data Analytics for the Internet of Things: An Overview", Wiley and Sons, First Edition, 2021.
2. Mahalle, Parikshit N., Gitanjali Rahul Shinde, and Arvind Vinayak Deshpande, “The convergence of internet of things and cloud for smart computing”, CRC Press, First Edition, 2021.

Reference Books

1. Mall Rajib, “Fundamentals of software engineering”, PHI Learning Pvt. Ltd., Fifth Edition, 2018.
2. Powell, Gavin, “Database Modeling Step-by-Step”, CRC Press, Taylor and Francis, First Edition, 2020.
3. Dulhare, Uma N., Khaleel Ahmad, and Khairol Amali Bin Ahmad, “Machine learning and big data: concepts, algorithms, tools and applications” John Wiley & sons, First Edition, 2020.
4. Mukhiya, Suresh Kumar, and Usman Ahmed, “Hands-On Exploratory Data Analysis with Python: Perform EDA techniques to understand, summarize, and investigate your data”, Packt Publishing Ltd, First Edition, 2020.

Mode of Evaluation: Continuous Assessment Test, Digital Assignment, Quiz and Final Assessment Test

List of Experiments (Indicative):

1. Environment monitoring system with cloud interface.
2. Mobile/web application for IoT enabled water quality monitoring.
3. IoT for smart home application.
4. Data aggregation, visualization and analysis in the cloud.
5. Loading, transformation (cleaning, refactoring) and analysis of telemetry datasets.
6. Merging databases and transformations (de-duplication, handling missing data) of any real-world datasets.
7. Demonstrate different data visualization techniques for real-world datasets.
8. Perform statistical measures (central tendency and dispersion) for an IoT application.
9. Develop an IoT based solution to automate any real-world problem.
10. Deployment of end to end IoT Application.

Total Laboratory Hours	**30 Hours**

Mode of assessment: Continuous assessment and FAT

Recommended by Board of Studies	28.02.2023		
Approved by Academic Council	No. 69	Date	16-03-2023