

IOT PROGRAMMING AND BIG DATA

Course Code: CSI 401

Credit Units: 03

Total Hours: 45

Course Objective:

The Internet of Things is creating massive quantities of data and managing and analysing it requires a unique approach to programming and statistics for distributed data sources. This course will teach introductory programming concepts that allow connection to, and implementation of some functionality on, IoT devices, using the Python programming language. In addition, students will learn how to use Python to process text log files, such as those generated automatically by IoT sensors and other network-connected systems.

Course Contents:

Module I: Introduction to IoT with Big Data: (11 Hours)

Introduction of IoT and Big Data, Programming for IoT in Big Data, IoT data processing with big data analytics, requirements for data security, device identity, Data and the Internet of Things Concepts of Big Data & Analytics, and the role of Big Data in IoT systems, the basic of cloud computing.

Module II: Data at the Edge and Cloud (7 Hours)

Introduction to Data acquisition, processing small and big data, Basics of descriptive statistics, the practical aspects in acquiring data from a sensor, Data in the Cloud, Data Cleaning Process, Cloud and Fog Computing for Big Data.

Module III: Fundamentals of Data Analysis and Big Data: (9Hours)

Fundamentals of Data Analysis and how to create visual 2D representations of the data. Data Analysis, data visualization tool, explore data using statistics and visualization to extract information and create hypotheses, Architecture for Big Data and Data Engineering: the basic principles behind the most important scalable solutions for Big Data such as Apache Hadoop and the related ecosystem of technologies.

Module IV: Data Analytics and Machine Learning: (11 Hours)

Advanced Data Analytics and Machine Learning, Storytelling with Data, learn about predictive analytics, the supervised and unsupervised approaches to machine learning and how to apply models to make predictions from the data. Obtaining, visualising and analysing data, IoT MicroMasters overview, Learn how to transform analytics results into a clear and convincing narrative and visual communication

Module V: Use of Machine Learning in Big Data Analytics and Data Engineering: (7 Hours)

Data wrangling, reshaping and cleaning, Cleaning the dataset for Big Data, Visualising the data Engineering, Predicting location, IoT Programming and Big Data, Visualising Big Data, Machine Learning for handling Big Data

Course Outcomes:

The student will learn

- Understand key IoT concepts with Big Data.
- Understand Data Analytics and Machine Learning.
- How IoT work with Big Data.

Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, S/V/Q/HA: Seminar/Viva/Quiz/ Home Assignment, EE: End Semester Examination.

Text & References:

- The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies by Erik Brynjolfsson and Andrew McAfee. ISBN-10: 0393239357
- Getting started with Internet of Things, by Cuno Pfister, Shroff; First edition (17 May 2011), ISBN-10: 9350234130
- Big Data and The Internet of Things, by Robert Stackowiak, Art licht, Springer Nature; 1st ed. edition (12 May 2015), ISBN-10: 1484209877

IOT PROGRAMMING AND BIG DATA LAB

Course Code: CSI 421

Credit Unit: 01

Total Hours: 30

Course Objective:

IoT Fundamentals curriculum provides students with a comprehensive understanding of the Internet of Things (IoT). It develops foundational skills using hands-on lab activities that stimulate the students in applying creative problem-solving and rapid prototyping in the interdisciplinary domain of electronics, networking, security, data analytics, and business.

Program List:

1. Installation of software needs of an IoT project: **(3 Hours)**
2. Understand how data is managed in an IoT network: **(3 Hours)**
3. Apply software solutions for different systems and Big Data to your IoT concept designs: **(3 Hours)**
4. Create Python scripts to manage large data files collected from sensor data and interact with the real world via actuators and other output devices: **(3 Hours)**
5. Implementation of pyspark: **(3 Hours)**
6. Implementation of map and reduce, filter function: **(3 Hours)**
7. Implementation of spark using Python Libraries: **(3 Hours)**
8. Software installation for Hadoop: **(3 Hours)**
9. How can write, compile and execute program on hadoop platform: **(3 Hours)**
10. Implementation of supervised and unsupervised learning: **(3 Hours)**

Course Outcomes:

The student will learn

- Understand key IoT concepts with Big Data.
- Understand Data Analytics and Machine Learning.
- How IOT work with Big Data.

Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V –Viva.

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- The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies by Erik Brynjolfsson and Andrew McAfee. ISBN-10: 0393239357
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