EET-4210: BIG DATA ANALYTICS FOR SMART MANUFACTURING

Cuyahoga Community College

Viewing: EET-4210 : Big Data Analytics for Smart Manufacturing

Board of Trustees:
September 2023

Academic Term:
Fall 2024

Subject Code
EET - Electrical/Electronic Engineer

Course Number:
4210

Title:
Big Data Analytics for Smart Manufacturing

Catalog Description:
Introduction to big data and analytics with a focus on manufacturing applications. Defining, collecting, storing, and visualizing data obtained through IIoT sensors at each stage of the manufacturing process throughout the supply chain to manage and optimize production. Use of query functions in relational database operations and use of analytic tools. Corresponding CISCO badge may be awarded upon successful completion of the course.

Credit Hour(s):
3

Lecture Hour(s):
2

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
EET-3200 Industrial IoT Fundamentals and Cybersecurity and EET-3300 Applications Programing for Smart Manufacturing.

Outcomes

Course Outcome(s):
Explain methods for collecting, storing, and visualizing data.

Essential Learning Outcome Mapping:
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Demonstrate how to acquire data.
2. Confirm the reliability of the collected data.
3. Confirm the validity of the collected data.
4. Identify and correct errors in the collected data.
5. Utilize common types of data visualizations to report findings.

Course Outcome(s):
Demonstrate acquisition and validation of collected data.

Essential Learning Outcome Mapping:

Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):

1. Use Hadoop software to solve big data problems and computations.
2. Examine how Virtualized Data Centers support Big Data & Analytics.
3. Utilize spreadsheets to transform data into a usable format.
4. Define structured data and unstructured data.
5. Use data analysis tools to define the lifecycle of data.
6. Explain how different sources of data are used within different aspects of data modeling.

Course Outcome(s):

Demonstrate usage of analysis tools including relational databases and spreadsheets.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Demonstrate usage of Edge Analytics and Cloud Analytics as applied to a manufacturing line.
2. Explain how business intelligence can be used to evaluate bottlenecks within a supply chain.

Course Outcome(s):

Explain the CIA triad (confidentiality, integrity, and availability) as a guideline for securing data.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Explain the differences between descriptive, predictive and prescriptive analytics.
2. Prepare the collected data to be used as needed in analytics.
3. Use CIA triad (confidentiality, integrity and availability) as a guideline for data security within an organization.

Methods of Evaluation:

1. Homework
2. Laboratory experiments and reports
3. Midterm examination
4. Final examination

Course Content Outline:

1. Types of Network Automation
    a. Data-Driven Automation
    b. Task-Based Automation
    c. End-to-End Automation
    d. Tools
2. Data for Network Automation
    a. The Importance of Data
    b. Data Formats and Models
    c. Methods for Gathering Data
3. Using Data from Your Network
    a. Data Preparation

b. Data Visualization
c. Data Insights

4. Ansible Basics
    a. Ansible Characteristics
    b. Installing Ansible
    c. Variables
    d. Playbooks
    e. Conditionals
    f. Loops
    g. Handlers
    h. Executing a Playbook
    i. Roles
5. Using Ansible for Network Automation
    a. Interacting with Files
    b. Interacting with Devices
    c. Interacting with APIs
6. Network DevOps
    a. What NetDevOps Is
    b. NetDevOps Tools
    c. How to Build Your Own NetDevOps Environment
7. Automation Strategies
    a. What an Automation Strategy Is
    b. Why You Need an Automation Strategy
    c. How to Build Your Own Automation Strategy
    d. How to Use an Automation Strategy

Resources

Pinton, Ivo. (2021) *Network Automation Made Easy*, Cisco Press.

Balusamy, Balamurugan, et al. (2021) *Big Data Concepts Technology and Architecture*, Wiley.

Marr, Bernard. (2021) *Data Strategy: How to Profit from a World of Big Data, Analytics and Artificial Intelligence*, Kogan Page.

Blokdyk, Gerardus. (2021) *IIoT*, 5STARCooks.

The Art of Service. (2020) *IIoT A Complete Guide*, IIoT Publishing.

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