Module Specification

Industrial Data Analytics

Version: 2024-25, v1.0, 15 Jun 2023

Contents

Module Specification **1**

Part 1: Information **2**

Part 2: Description **2**

Part 3: Teaching and learning methods **4**

Part 4: Assessment **6**

Part 5: Contributes towards **8**

Part 1: Information

Module title: Industrial Data Analytics

Module code: UFMEV1-30-2

Level: Level 5

For implementation from: 2024-25

UWE credit rating: 30

ECTS credit rating: 15

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: Yes

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: The Industrial Data Analytics module is designed to provide students with the skills and knowledge to analyse and interpret large data sets from industrial processes and systems. The module will cover key concepts and techniques in data analytics, including data visualisation, statistical analysis, machine learning, and big data processing.

Throughout the module, students will have the opportunity to work on real-world data

sets and projects, allowing them to apply their knowledge and skills in a practical setting. The module will also include guest lectures from industry experts and visits to industrial sites to give students a first-hand look at how data analytics is used in the real world.
Upon completing the Industrial Data Analytics module, students will be able to understand the basics of data analytics and how it is applied in the industrial sector, extract and manipulate data from various sources, use visualisation tools to explore and understand data patterns and trends, apply statistical analysis and machine learning techniques to industrial data sets, process and analyse large data sets using big data technologies, and apply their knowledge and skills to real-world data sets and projects in the industrial sector. They will also be able to understand the ethical and privacy considerations involved in working with industrial data and effectively communicate their findings and insights to both technical and non-technical audiences.

Features: Not applicable

Educational aims: The main educational aim of the Industrial Data Analytics module is to provide students with the skills and knowledge needed to analyse and interpret large data sets from industrial processes and systems. Through a combination of lectures, hands-on exercises, and real-world projects, students will learn key concepts and techniques in data analytics, including data visualisation, statistical analysis, machine learning, and big data processing. Upon completing the module, students will be able to apply their knowledge and skills to a variety of data analytics problems in the industrial sector and be well-equipped to pursue careers in this rapidly-growing field.

Outline syllabus: I. Introduction to Data Analytics
-Basics of data analytics and its applications in the industrial sector
-Tools and technologies used in data analytics
-Extracting, transforming, and loading data from various sources

II. Data Visualization
-Introduction to data visualisation and its importance in data analysis
-Exploring and understanding data patterns and trends using visualisation tools
-Best practices for creating effective visualisations

III. Statistical Analysis
-Fundamentals of statistical analysis
-Descriptive statistics for summarising data
-Inferential statistics for making predictions and testing hypotheses

IV. Machine Learning
-Introduction to machine learning and its applications in the industrial sector
-Supervised and unsupervised learning algorithms
-Evaluating and improving machine learning models

V. Big Data Processing
-Introduction to big data and its challenges
-Distributed systems and parallel processing for big data
-Tools and technologies for storing, processing, and analysing large data sets

VI. Real-World Data Sets and Projects
-Working with real-world data sets and projects in the industrial sector
-Applying data analytics techniques to solve problems and improve processes
-Communicating findings and insights effectively to both technical and non-technical audiences

VII. Ethical and Privacy Considerations
-Understanding the ethical and privacy considerations involved in working with industrial data
-Best practices for handling and protecting sensitive data

VIII. Guest Lectures and Industry Visits
-Guest lectures from industry experts on the latest trends and challenges in data analytics
-Visits to industrial sites to see data analytics in action.

Part 3: Teaching and learning methods

Teaching and learning methods: The Industrial Data Analytics module will be taught through a combination of lectures, hands-on exercises, and real-world projects.

Lectures will provide students with a foundation of knowledge on key concepts and techniques in data analytics, including data visualisation, statistical analysis, machine learning, and big data processing. These lectures will be supplemented with slides, demos, and other multimedia materials to help students better understand the material.

Hands-on exercises will give students the opportunity to apply what they have learned in a practical setting. These exercises may include working with sample data sets, building and testing machine learning models, and implementing big data processing techniques.

Real-world projects will allow students to work on data analytics problems and projects that are relevant to the industrial sector. These projects will provide students with the opportunity to apply their knowledge and skills in a practical setting, and to gain experience working on real-world problems.

In addition to lectures, hands-on exercises, and real-world projects, the module will also include guest lectures from industry experts and visits to industrial sites. These activities will provide students with the opportunity to learn from experienced professionals and see data analytics in action in the real world.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Demonstrate the importing, cleansing, transforming, and validating of data to understand or make conclusions from the data. [AHEP4: M3(F); PO1, PO3]

MO2 Apply a range of analytical, visualisation, and modelling techniques to identify and predict trends and patterns in data. [AHEP4: M6(F); PO2&PO4]

MO3 Design, develop, and apply industry-standard artificial intelligence and machine learning solutions to analyse industrial datasets and derive inferences. [AHEP4: M3(F); PO3]

MO4 Evaluate the ethical and privacy considerations and risks involved in working with industrial data and communicate their findings and insights effectively to both technical and non-technical audiences. [AHEP4 M9(F), PO8]

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/items/c5b91781-4ca9-4e74-bf8b-939b6c5f5ee1.html?lang=en&login=1

Part 4: Assessment

Assessment strategy: Assessment of this module (for both sit and resit) consists of the following:

Presentation

Every student will deliver a 15-minute video/presentation summarising the student's initial research to identify a relevant aspect of industrial data analytics and how they will apply and analyse performance in the project work.

Written Assignment

Students will be required to import, cleanse, transform, and validate industrial data and prepare a business-style report making conclusions from the data to support making business decisions and identifying patterns, including appropriate data visualisation, summarising, and presenting the results to a range of stakeholders. The report must include the artefact developed to demonstrate the results.

Time-Controlled Assessment

Students will be required to integrate industrial data by utilising an industry-standard Data Definition Language or Data Manipulation Language software to analyse datasets and derive inferences.

Assessment tasks:

Presentation (First Sit)
Description: Presentation (15 mins)
Weighting: 20 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO4

Written Assignment (First Sit)
Description: Report
Weighting: 40 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3, MO4

In-class test (First Sit)
Description: This is a time controlled assessment
Weighting: 40 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Presentation (Resit)
Description: Presentation (15 mins)
Weighting: 20 %
Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO4

Written Assignment (Resit)

Description: Report

Weighting: 40 %

Final assessment: No

Group work: No

Learning outcomes tested: MO3, MO4

In-class test (Resit)

Description: This is a time controlled assessment

Weighting: 40 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Mechatronics Engineering [Frenchay] MEng 2023-24

Mechatronics Engineering [Frenchay] BEng (Hons) 2023-24