Module Specification

Data Analytics

Version: 2024-25, v1.0, 11 Jul 2023

Contents

Part 1: Information

Module title: Data Analytics

Module code: UFCE54-30-2

Level: Level 5

For implementation from: 2024-25

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Computer Sci & Creative Tech

Partner institutions: None

Field:

Module type: Module

Pre-requisites: Database Development 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Data science and analytics is an exciting, rapidly evolving discipline that offers enormous potential for the future of computer science. Keeping up with the rapidly evolving field of a modern data scientist requires fundamental data wrangling and statistical skills. This module is designed to introduce students to programming and statistical concepts frequently used within data science.

Features: Not applicable

Educational aims: The purpose of this module is to introduce data analysis and interpretation, sources of data, methods of data presentation and description, and how to conduct simple hypothesis tests and make inferences. On completion of the module, there should be an ability to draw on statistics appropriately to support arguments and be able to better understand and critique statistical analysis encountered in academic papers in subsequent courses.

Outline syllabus: Basic data analysis tasks and techniques review.

Basic probability and nature of statistical investigations

Probability theory and statistical distributions

Bayesian and Frequentist statistics

Statistical Computing

Conditional, Joint and Marginal Probability

Sampling distributions

Descriptive Statistics – Summarizing data using indexes

Statistical Inference – Drawing conclusions using statistical tests

Introduction to coding for data science

Introduction to machine learning, Eg, Unsupervised Vs Supervised learning, reinforcement learning

Regression techniques – OLS, LLS, Multi-Linear, Polynomial

Part 3: Teaching and learning methods

Teaching and learning methods: Learning and teaching will be provided to students through lectures and computer labs. During lectures, theoretical aspects of the module will be provided to students by the teaching staff. Lectures will be supported by presentation published and available to the students on Teams as well as additional materials (publications, videos, etc.).

Computer labs are devoted to practical data analysis using modern software. R will be used for illustration of techniques and output analysis; students are allowed to use other software packages (Python, Julia, etc.) by a prior agreement with the module instructor. Computer lab classes are reserved for requirement clarifications, problem discussion, and assessment. Students are expected to carry out the work independently outside the classes.

Scheduled learning includes lectures, seminars, tutorials, demonstration, practical classes, and workshops; external visits; supervised time in studio/workshops.

Independent learning includes hours engaged with essential and further reading, case study preparation, assignment preparation and completion and preparation for practical workshops.

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

MO1 Evaluate fundamental concepts in basic probability, probability theory, both statistical and sampling distributions, and statistical inference and modelling.

MO2 Demonstrate and explain the use of descriptive statistics to formulate data analytics questions as statistical problems.

MO3 Evaluate the difference between Bayesian and Frequentist frameworks for statistical inference, including their strengths, limitations and the differences between them.

MO4 Apply a range of regression techniques to an existing dataset and obtain well-grounded business insights performing a statistical analysis, with key references to a statistician's process, and using data visualization.

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

Part 4: Assessment

Assessment strategy: This module has been designed with two key assessments to explore the theory of Data Analytics and demonstrate techniques.

Presentation - a 15-minute presentation to apply knowledge in solving data and statistical problems
Lab Report - a 1500-word individual lab report on statistical analysis

In the first assessment students/apprentices will be required to create an individual 10 minute presentation from the foundations of a statistical analysis conducted in class, followed by 5 minutes of questioning/discussion.

This presentation will require students to evaluate various statistical frameworks and demonstrate their understanding and knowledge of statistical inference and modelling.

In the final assessment students will conduct a 1500 word individual lab report based upon an exploratory analysis of a dataset and apply various regression techniques within the data. They will further need to use descriptive statistics to summarize the data, statistical inference to draw conclusions and data pre-processing to ensure the data prepared is correct.

Once completed, students will provide a background on the dataset, explain feature selection and the methodology used for the analysis, explain and justify the results, and draw conclusions based upon those results.

Students will conduct the work individually and independently. Resit opportunities will follow the same format as the first sit, with an alternate dataset provided.

Assessment tasks:

Presentation (First Sit)
Description: A 15 minute presentation to apply knowledge in solving data and statistical problems (10 minute presentation + 5 minute discussion and questions)
Weighting: 40 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO3

Laboratory Report (First Sit)
Description: A 1500 word individual lab report on statistical analysis
Weighting: 60 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO2, MO4

Presentation (Resit)
Description: A 15 minute presentation to apply knowledge in solving data and statistical problems (10 minute presentation + 5 minute discussion and questions)
Weighting: 40 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO3

Laboratory Report (Resit)
Description: A 1500 word individual lab report on statistical analysis

Weighting: 60 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO2, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Digital and Technology Solutions (Data Analyst) {Apprenticeship-UCW} [UCW] BSc (Hons) 2023-24