COURSE SPECIFICATION DOCUMENT

Academic School/Department: Science, Innovation & Technology

Programme: Mathematics and Data Science

FHEQ **Level:**   5

Course Title: Data Analytics and Visualisation

Course Code: DATA 5102

Total Hours: 160
Timetabled Hours: 45
Guided Learning Hours: 15
Independent Learning Hours: 100

Credits: 16 UK credits
                                     8 ECTS credits
                                     4 US credits

Course Description:

This course aims to equip students with a comprehensive understanding of fundamental concepts in data analysis and visualization with an exploration of big data. The primary focus will be on utilizing Tableau as a powerful tool for data visualization while also introducing students to Python and R for data processing and analysis. Through hands-on practice and theoretical learning, students will develop the skills necessary to analyse and visualize data effectively. Additionally, the module will delve into the complexities of big data, providing insights into its management, processing, and the challenges associated with its analysis. By the end of this module, students will have a strong understanding of using Tableau for visual representation and gain introductory knowledge of Python's and R capabilities in handling and analysing data based on descriptive, diagnostic, predictive and prescriptive analytics, which will enable learners to create meaningful insights from diverse datasets.

Prerequisites:

40 credits

Aims and Objectives:

The module aims to:

- Provide a systematic understanding of the Data Analytics Life Cycle, applying critical awareness and in-depth knowledge to analyse and interpret its stages.

- Employ and integrate advanced analytical theories and methods systematically and creatively.

- Acquire and demonstrate practical skills in utilizing modern data analytical tools and techniques.

- Critically evaluate and creatively apply appropriate analytic tools and techniques to analyse a variety of datasets from a practical perspective.

- Make effective use of data analytical and visualization tools such as Python, R, Tableau and other available software if needed.

Programme Outcomes:

L5 AI, AII, BI, BII, CI, CII, DI, DII

A detailed list of the programme outcomes is found in the Programme Specification. This is maintained by Registry and located at: https://www.richmond.ac.uk/programme-and-course-specifications/

Learning Outcomes

By the end of this course, successful students should be able to:

1. Analyse data to investigate data patterns and structures and provide insights into consequences and causations of such phenomenon.

2. Use historical data to predict what will happen, should existing trends continue, and to inform decisions so that one can attempt to make things happen, and potentially break from existing trends.

3. Understand how to make use of regular reports that answer recurring questions or intelligence summaries that flag potential areas of action for stakeholders.

4. Make use of methodologies of representing data graphically, data drilling and mining, machine learning and pattern matching.

5. Analyse the application of computational intelligence to decision making problems in a relevant Business and Industrial context.

6. Analyse the results output from data analytical tools such as Tableau, Python and R, and some machine learning algorithms.

7. Demonstrate an awareness of the benefits of data Analysis for industry and society.

Indicative Content:

- Exploratory data analysis using probability theory, sampling, hypothesis testing and regression analysis.

- Pattern, trends, and correlations through appropriate data visualisation techniques, relevant to the learners' practical applications.

- Application of computational intelligence to decision making problems and data analytical and visualization tools in a relevant practical context.

- Building and applying digitalization of process modules using available tools such as Tableau, Python and R to understand the need to generate suitable datasets to extract valuable information.

- Fundamentals of data analysis and visualisation / Introduction to Tableau, Big Data and Analysis Life Cycle.

- Process of data analysis, decision making, uncertainty in data visualisation and design.

- Applications of R, Tableau and Python in data analytics, visualisation, and future of data.

Assessment:

This course conforms to the University Assessment Norms approved at Academic Board and located at: https://www.richmond.ac.uk/university-policies/

Teaching Methodology:

This course will be delivered face to face through a combination of lectures and interactive sessions. In addition to classroom activities, there are guided learning elements that are tutor led and arranged through Blackboard. These activities can be asynchronous online sessions, flipped classrooms, set readings with discussion boards or set guest lectures for example. Set activities are monitored by the instructor to ascertain student engagement. Students are encouraged to prepare for class and to play an active part, to raise questions, following-up ideas and interact with a wide range of provided material.

Indicative Text(s):

Ceder, N. (2018) T*he Quick Python Book*. 3rd edn. Shelter Island, NY: Manning Publications Co.

EMC, Data Science and Big Data Analytics (2015) *Discovering, Analyzing, Visualizing and Presenting Data*. Hoboken, NJ: Wiley.

Sedkaoui, S. (2018) *Data Analytics and Big Data*. London: ISTE Ltd/John Wiley and Sons Inc.

Wilke, C.O. (2019) F*undamentals of Data Visualization.* Sebastopol, CA: O'Reilly Media.

Change Log for this CSD:

Nature of Change	Date Approved & Approval Body (School or AB)	Change Actioned by Academic Registry
First Edition	Nov 2024	