Module code: MOD007893	**Version:** 2 **Date Amended:** 12/Jul/2023

1. Module Title

Applied Data Analysis and Research Methodology

2a. Module Leader

Imran Ahmed

2b. School

School of Computing and Information Sciences

2c. Faculty

Faculty of Science and Engineering

3a. Level

7

3b. Module Type

Standard (fine graded)

4a. Credits

30

4b. Study Hours

300

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	MSc Applied Data Science		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This module provides an insight into the applications of data science. It is designed with no assumption of prior exposure to statistical data analysis and computer programming. It allows you to design and develop data-driven predictions models to extract meaningful information from seemingly unstructured and uncleaned data through probabilistic modelling and statistical inference. You will identify and deploy appropriate methodologies and modelling techniques in order to extract meaningful information for decision making and visualization. You will practice with various tools such as powerful Python libraries including NumPy, Pandas, Matplotlib, Scikit-learn and Seaborn to create end-to-end data analysis pipelines through real-world case studies from various industrial domains such as healthcare, finance, retail and IT. Moreover, you will acquire essential skills required for project management and planning, so that you can conduct scientific research. It will enable you to adopt appropriate methodologies and identify suitable technologies to address the research gaps, and thus formulate a sound project proposal.

6b. Outline Content

This module covers the content required so that students can carry out an end to end data science project. It is designed based on Python, one of the most prevalent, powerful yet intuitive programming language for data science applications. This module starts with a comprehensive revision on Python programming language and its essential features and components. This module also covers the essential data science topics and skills including data cleansing and preparation, data analysis principles, data modelling and analysis (with focus on real-world case studies from various domains including HR, marketing, business, retail), data visualization (Tableau, PowerBi). Several powerful Python libraries including numpy, pandas, matplotlib, scikit-learn and, seaborn will also be covered in this module.

Furthermore, the module instructs the students on the main techniques required to critically appraise published research and carry out a piece of original research from the ground up. Students will gain the experience of topic specific research, analysis, and application which helps them conduct a data science research project.

This module conveys essential skills in project management and planning so that students can develop a viable research project plan, identify appropriate methodologies and technologies, and conduct a project.

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources

Computer with a processor speed of 1.8GHz (or better), at least 8GB RAM and 256MB hard disk

Access to a programming environments including Anaconda and Pycharm.

7. Learning Outcomes (threshold standards)

No.	Type	On successful completion of this module the student will be expected to be able to:
1	Knowledge and Understanding	Understand data and knowledge discovery approaches and data driven decision making processes.
2	Knowledge and Understanding	Understand and critically appraise concepts of data analysis, including data cleansing, interpreting, feature extraction, data summarising, as well as visualising and representing.
3	Knowledge and Understanding	Understand the nature of research in higher education, recognising the social, legal and ethical issues associated with research and experimentation.
4	Intellectual, practical, affective and transferrable skills	Design and develop end-to-end pipelines for data analysis based on real-world case studies from various industrial domains such as healthcare, finance, retail and IT.
5	Intellectual, practical, affective and transferrable skills	Implement practical solutions based on real-world scenarios and challenges using industry standard data cleaning, analysis and visualisation libraries, tools and techniques.
6	Intellectual, practical, affective and transferrable skills	Develop skills to critically evaluate complex issues from a variety of viewpoints and rigorously apply appropriate methodologies, techniques and practical strategies towards developing a sound project proposal.

8a. Module Occurrence to which this MDF Refers

Year	Occurrence	Period	Location	Mode of Delivery
2025/6	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence

Learning Activities	Hours	Learning Outcomes	Details of Duration, frequency and other comments
Lectures	36	1,2,3,4	3 hours lecture per week
Other teacher managed learning	24	1,2,3,4	2 hours tutorial per week
Student managed learning	240	1,2,3,4	Self-directed learning
TOTAL:	300		

9. Assessment for the above Module Occurrence

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
010	Coursework	1-6	100 (%)	Fine Grade	30 (%)

2 Components - Component 1 - In-class test (90 minutes) Component 2 - Research project report, equivalent to 2000 words

Assessment components for Element 010

Component No.	Assessment Title	Submission Method	Weighting (%)	Components needed for Mark Calculation?
010/1	In-class test (90 minutes)	Scheduled Activity: Timetabled assessment task	40 (%)	All
010/2	Research project report (equivalent to 2000 words)	Canvas	60 (%)	

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]