Module Descriptor

Title	Artificial Intelligence Applications		
Session	2025/26	**Status**	Published
Code	COMP10086	**SCQF Level**	10
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Jacob Koenig		

Summary of Module

This module builds on the foundational knowledge acquired in previous data science modules. It focuses on the practical aspects of applying machine learning (ML) to real-world problems, with an emphasis on machine learning engineering. Students will cover ML project management methodologies, development workflows, model training, packaging, deployment, and scaling of solutions, gaining hands-on experience in building, and deploying production-ready ML systems using suitable technologies.

Additionally, this module will also focus on environmental, ethical, and professional issues when applying ML.

The syllabus will include the following:

- ML applications
  - Application domains of ML
  - Application methods (cloud, edge, on-premise)
- Ethics in ML systems
  - Bias: definition, measuring and monitoring
  - Interpretability of models
- ML engineering
  - Definition
  - Roles within ML Teams
  - Challenges
- Developing ML
  - Project methodologies: Scrum, Crips-DM
  - Processes and workflows
  - CI/CD
- ML models
  - ML model definition
  - Model training
  - Model drift: detection and strategies

- Feature engineering
  - Automated training
  - Training pipelines
  - Model registries
- Deployment of ML
  - Challenges
  - Architectural considerations: microservices, serverless
  - Scalability: parallel and distributed computing
  - Packaging ML models
- Modern ML
  - Deep Learning
  - Generative AI
  - Large Language Models

Some example tasks undertaken by students throughout this module are: The deployment of an ML pipeline, the creation of an ML microservice and the critical examination of various real-life ML projects considering factors such as bias and interpretability.

This module will work to develop a number of the key 'I am UWS' Graduate Attributes to make those who complete this module:

- Universal: analytical; ethically-minded; and socially responsible
- Work Ready: enterprising; knowledgeable; and an effective communicator
- Successful: innovative; transformational; and resilient

Module Delivery Method	**On-Campus**[1] ☒	**Hybrid**[2] ☐	**Online**[3] ☒	**Work -Based Learning**[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☒ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify) Online Delivery / Distance Learning applies to delivery in the BSc (Hons) Data, AI and Software	

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

					Engineering Programme only	
Terms for Module Delivery	Term 1	☒	Term 2	☐	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Critically evaluate ethical considerations in machine learning applications
L2	Select and justify appropriate methods associated for the application and deployment of machine learning solutions, considering architectural considerations such as microservices and serverless architectures, as well as scalability
L3	Demonstrate a detailed understanding of the machine learning engineering process
L4	Develop and deploy a machine learning system using appropriate tools and practices, ensuring reliability, scalability, and ethical considerations.
L5	N/A

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**
Knowledge and Understanding (K and U)	**SCQF 10** Detailed knowledge and understanding of the concepts and principles of the machine learning engineering process Understanding of the ethical issues that are apparent when developing machine learning applications
Practice: Applied Knowledge and Understanding	**SCQF 10** Execute a defined project of identifying the requirements and methods and completing an implementation and deployment of a machine learning solution using the specific technologies covered by the module.
Generic Cognitive skills	**SCQF 10** Demonstrate some originality and creativity in dealing with professional-level issues such as those presented by coursework. Make recommendations where data/information is limited or comes from a range of sources such as internal company documentation and/or data files.
Communication, ICT and Numeracy Skills	**SCQF 10** Present and convey information about machine learning engineering in the form of the coursework
Autonomy, Accountability and Working with Others	**SCQF 10** Exercise autonomy and initiative when working with a range of tools that enable the development and deployment of machine learning solutions

Prerequisites	**Module Code**	**Module Title**

	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	18
Tutorial / Synchronous Support Activity	6
Laboratory / Practical Demonstration / Workshop	24
Independent Study	152
Please select	
Please select	
TOTAL	200

Indicative Resources
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: Duke, T. (2023) Building Responsible AI Algorithms A Framework for Transparency, Fairness, Safety, Privacy, and Robustness. Apress. McMahon, A.P. (2023) Machine Learning Engineering with Python. Packt Publishing Ltd. Staron, M. (2024) Machine Learning Infrastructure and Best Practices for Software Engineers. Packt Publishing
(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements
In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time. **For the purposes of this module, academic engagement equates to the following:** The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. You will scan your attendance via the scanners each time you are on-campus and you will login to the VLE several times per week. Where you are unable to attend a timetabled learning session due to illness or other circumstance, you should notify the Programme Leader that

you cannot attend. Across the School an 80% attendance threshold is set. If you fall below this, you will be referred to the Student Success Team to see how we can best support your studies.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Computing**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Business & Applied Computing
Moderator	Graham Parsonage
External Examiner	A Jindal
Accreditation Details	
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	1.02

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
A Report of practical work that shows the student's approach to deploying a machine learning model to a given case-study-like problem including justifications and ethical considerations taken. (100%)
Assessment 2
Assessment 3
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed.

(ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Report of practical/ field/ clinical work	☒	☒	☒	☒	☐	100	

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	hours

Change Control

What	**When**	**Who**
Attendance and Engagement Procedure and Equality and Diversity	17/1/25	F.Valentine
Updated spelling and formatting. Added moderator. Changed mode of delivery and campus to accomodate GA programme delivery	20/01/25	J. Koenig