Title of Module: Artificial Intelligence and Applications			
Code: COMP11103	**SCQF Level: 11** (Scottish Credit and Qualifications Framework)	**Credit Points: 20**	**ECTS: 10** (European Credit Transfer Scheme)
School:	School of Computing, Engineering and Physical Sciences		
Module Co-ordinator:	Naeem Ramzan		

Summary of Module
This module covers the main analytical skills and tools in the field of Artificial Intelligence (AI). It will also build on the foundations on how to properly communicate this information to the relevant audience. The students will be progressively guided through the world of AI starting from an introduction to AI and its core concepts of designing and enabling AI by means of different methods including machine learning and genetic programming. Students will embark on the real-world problems and learn how to apply AI algorithms using a variety of existing architectures and languages including Python. Additional key advanced concepts and research trends in the field of AI will also be presented as well as the basic needed principles to communicate clearly and effectively. A special attention will thus be paid to AI applications so that the students will able to apply the AI techniques on the variety of problems.   With a diversity of lectures and lab work, the students will be able to make informed decisions on the most suitable methods to analyse how to apply AI on specific problems and get hands-on experience on their application. They will also learn how to interpret the results and communicate their findings using the appropriate visualisation tools and techniques.   - Introduction to AI   - Methods for machine learning   - Data preparation   - Basic Analytics/Pre-processing/Classifications   - Neural networks and Deep neural networks •   - Natural language processing •   - Applications of AI

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**HybridO**	**Work-based Learning**
	✓				

Face-To-Face
Term used to describe the traditional classroom environment where the students and the lecturer meet synchronously in the same room for the whole provision.
Blended
A mode of delivery of a module or a programme that involves online and face-to-face delivery of learning, teaching and assessment activities, student support and feedback. A programme may be considered "blended" if it includes a combination of face-to-face, online and blended modules. If an online programme has any compulsory face-to-face and campus elements it must be described as blended with clearly articulated delivery information to manage student expectations
Fully Online

Instruction that is solely delivered by web-based or internet-based technologies. This term is used to describe the previously used terms distance learning and e learning.
HybridC
Online with mandatory face-to-face learning on Campus
HybridO
Online with optional face-to-face learning on Campus
Work-based Learning
Learning activities where the main location for the learning experience is in the workplace.

Campus(es) for Module Delivery

The module will **normally** be offered on the following campuses / or by Distance/Online Learning:
(Provided viable student numbers permit)

Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
✓						

Term(s) for Module Delivery

(Provided viable student numbers permit).

Term 1	✓	Term 2		Term 3	

Learning Outcomes: (maximum of 5 statements)

On successful completion of this module the student will be able to:
L1. LO1: Gain deep Knowledge and comprehensive understanding of the main methods and tools available for AI, including the underlying theoretical concepts.
L2. LO2: Apply and evaluate different machine learning methods to real problems and make an informed decision on their suitability for specific situations.
L3. LO3: Design AI methodologies for specific problems including effective communication of main findings to relevant audiences, and critically appraise the results.

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 Level 11. Comprehensive knowledge and understanding of the main methods and tools employed for AI including the underlying theory and principles.
Practice: Applied Knowledge and Understanding	SCQF Level 11. Apply a variety of AI methodologies to real situations and communicate the results using available visualisation tools.
Generic Cognitive skills	SCQF Level 11. Critical knowledge of the state-of-the-art in AI. Identify most suitable methods/tools to make informed decisions in a real situation. Design a complete AI methodology and communicate findings in real problems.
Communication, ICT and Numeracy Skills	SCQF Level 11. Effectively communicate the information extracted from AI applications using a variety of available tools, both from report writing and presentations. Critically appraise numerical results gathered from the analysed data.

Autonomy, Accountability and Working with others	SCQF Level 11. Initiative and autonomy working in lab assignments. Students will also work as part of a team in project assignments and must develop a sense of accountability to others.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code:	**Module Title:**
	Other:	
Co-requisites	**Module Code:**	**Module Title:**

* Indicates that module descriptor is not published.

Learning and Teaching
The module will be delivered by means of lectures and supervised hands-on lab work. Lectures will cover the theoretical background and practical applicability in real life problems. Concepts will be introduced by posing a practical problem and working out the needed theoretical knowledge to solve them. The delivery will encourage student participation to ensure an active learning experience. Group discussions will be held to promote critical thinking and boost informed decisions on the suitability of different state-of-the-art methods. Lab exercises will help student develop their knowledge in incremental fashion using a learning-by-doing approach. This will support the development of knowledge and understanding of the topics. In addition, labs will develop their skills to carry out a full AI project and communicate the results, which will be part of the final assessment.

Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	20
Laboratory/Practical Demonstration/Workshop	26
Independent Study	154
	200 Hours Total

**Indicative Resources: (eg. Core text, journals, internet access)
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: [1] ERTEL W, 2011, Introduction to Artificial Intelligence, Springer   [2] Russell and Norvig. Artificial Intelligence: A Modern Approach.   [3] N D LEWIS, 2016, Deep Learning Step by Step with Python   [4] Bart Baesens. Analytics in a Big Data World. The Essential Guide to Data Science and its Applications. John Wiley & Sons   [5] I. H. Witten and E. Frank. Data Mining. Practical Machine Learning Tools and Techniques: Morgan Kauffman

[6] S. Theodoridis and K. Koutrumbas. Pattern Recognition. Academic Press.

Additional Resources can be found online and in scientific databases.

(**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)

Engagement Requirements

In line with the Academic Engagement Procedure, Students are defined as academically engaged if they are regularly engaged with timetabled teaching sessions, course-related learning resources including those in the Library and on the relevant learning platform, and complete assessments and submit these on time. Please refer to the Academic Engagement Procedure at the following link: Academic engagement procedure
Where a module has Professional, Statutory or Regulatory Body requirements these will be listed here:
Standard University attendance regulations will apply.

Supplemental Information

Programme Board	Computing
Assessment Results (Pass/Fail)	No
Subject Panel	Applied Computing
Moderator	Zeeshan Pervez
External Examiner	
Accreditation Details	BCS
Version Number	1.01

Assessment: (also refer to Assessment Outcomes Grids below)

A. Exam (30%). Students will be required to take an online exam. The exam will both contain theoretical and practical questions aiming at assessing the achievement of LO1 and LO2.

B. Coursework(70%). Students will work in groups to develop a specific AI application. Coursework will assess achievement of LO2 and LO3 by means of a written report justifying the selection of methods, detailing the analysis, and presenting the results. Lab implementations will also be submitted and the main findings presented to the class.

(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 Handbook.)

Assessment Outcome Grids (Footnote A.)

Component 1

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetabled Contact Hours	

Unseen closed book (standard)	✓	✓		30	2	

Component 2

Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetabled Contact Hours	
Report of practical/ field/ clinical work		✓	✓	60	0	
Presentation			✓	10	2	
Combined Total For All Components				100%	4 hours	

Footnotes
A. Referred to within Assessment Section above
B. Identified in the Learning Outcome Section above

Note(s):

1. More than one assessment method can be used to assess individual learning outcomes.
2. Schools are responsible for determining student contact hours. Please refer to University Policy on contact hours (extract contained within section 10 of the Module Descriptor guidance note).
   This will normally be variable across Schools, dependent on Programmes &/or Professional requirements.

Equality and Diversity

The University policies on equality and diversity will apply to this module. In order for the student to complete this module the student will be required to view photographic image materials. Students whose vision and hearing is substantially impaired should be assessed and counselled prior to them selecting courses requiring this module.
When a student discloses a disability a special needs advisor will agree the appropriate adjustments to be made, consulting with the module coordinator if necessary.
Diversity in cultures, backgrounds, abilities, learning and cognitive styles and individual differences are valued and appreciated. The assessments have taken this into account.

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School.)

UWS Equality and Diversity Policy

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)