UNIVERSITY OF THE WEST OF SCOTLAND
MODULE DESCRIPTOR

1.	**Title of Module: Artificial Intelligence and Applications**			
2.	**Code:** COMP11127	**SCQF Level:** 11 (Scottish Credit and Qualifications Framework)	**Credit Points:** 20	**ECTS:** 10 (European Credit Transfer Scheme)
3.	**School:**	School of Engineering and Computing		
4.	**Module Co-ordinator:**	Naeem Ramzan, PhD		
5.	**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. An indicative outline of the topics that will be covered follows: • 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			
6.	**Learning Outcomes:**			
	At the end of this module the student will be able to: LO1: Gain deep Knowledge and comprehensive understanding of the main methods and tools available for AI, including the underlying theoretical concepts. LO2: Apply and evaluate different machine learning methods to real problems and make an informed decision on their suitability for specific situations. LO3: Design AI methodologies for specific problems including effective communication of main findings to relevant audiences, and critically appraise the results.			
7.	**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 & U)	SCQF11: Comprehensive knowledge and understanding of the main methods and tools employed for AI including the underlying theory and principles.		

	Practice: Applied Knowledge and Understanding	SCQF11: Apply a variety of AI methodologies to real situations and communicate the results using available visualisation tools.	
	Generic Cognitive Skills	SCQF11: 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	SCQF11: 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	SCQF11: 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.	
	(N.B. *Refer to www.scqf.org.uk website for further details relating to the SCQF Level Descriptors)		
8.	**Pre-requisites:**	Before undertaking this module the student should have undertaken the following:	
		Module Code: Other:	Module Title: None
		Note: No specific module is required, but a basic knowledge on statistics and maths involved is expected.	
	Co-requisites:	Module Code: None	Module Title: None
9.	**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/Categories: 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
Asynchronous Class Activity	48
Independent study and revision	102
Examination	2
Presentation of coursework	2
Total	200 Hours Total

10.	**Assessment:** (also refer to Assessment Outcomes Grids at end of document)
	The assessment consists of two categories: 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 achievemeng 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.
11.	**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.)
12.	****Indicative Resources:** (eg. Core text, journals, internet access)
	The following materials form essential underpinning for the module content and ultimately for the learning outcomes. Lectures notes and hand-outs will be provided through moodle: [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. Analystics 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. Software packages: • Phython • R with relevant packages (ggplot2, etc.)
13.	**Attendance Requirements:**
	Standard University attendance regulations will apply.
14.	**Campus(s) for Module Delivery:**
	The module will **normally** be offered on the following campuses / or by Distance Learning (D/L) (ie.Virtual Campus): (Provided viable student numbers permit)

Paisley:	Ayr:	Crichton:	Hamilton:	D/L Virtual Campus:	Other: (Please specify)
✓					

15.	**Course Reference Numbers (CRNs):** (if known)					
	Paisley:	Ayr:	Crichton:	Hamilton:	D/L Virtual Campus:	Other: (Please specify)
	✓					

16.	**Trimester(s) for Module Delivery:**					
08/09	Trimester 1 (Session 2015/16)	✓	Trimester 2 (Session 2015/16)		Trimester 3 (Session 2015/16)	

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17.	**Subject Development Group (SDG)**	Computing
18.	**Assessment Results (Pass / Fail)**	No
19.	**Subject Panel**	Required

20.	**Moderator**	Required
21.	**External Examiner**	TBC
22.	**Accreditation Details**	Not required at present
23.	**Changes / Version Number**	V 0.1

Assessment Outcomes Grids (referred to within Section 10)

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ASSESSMENT CATEGORY 1	Learning Outcome (Identified in Section 8)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
	Online Examination	✓	✓				30	2
	Written Assignment							
	Presentation Assignment							
	Class Test							
	Oral Examination/Viva							
	Practical Examination							
	Placement / WBL Elements							
	Laboratory Reports							
	Other, Please specify: Online test							

ASSESSMENT CATEGORY 2	Learning Outcome (Identified in Section 8)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
	Formal Written Examination							
	Written Assignment		✓	✓			30	
	Presentation Assignment			✓			10	2
	Class Test							
	Oral Examination/Viva							
	Practical Examination							
	Placement / WBL Elements							
	Laboratory Reports							
	Other, Please specify: Laboratory implementation		✓				30	
						Combined Total for All Assessment Categories	100%	