

University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: AI Programming for Games			
Code: COMP09041	SCQF Level: 9 (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:	Paul Keir		
Summary of Module			
<p>This module will provide a hands-on introduction to the application of artificial intelligence (AI) methods to real-world problems from the domain of videogames. Students are first introduced to mainstream videogame AI topics, including steering; individual and group pathfinding; behaviour trees; and constraint solvers. Classic topics from AI are subsequently covered, including neural networks; computer vision; and game theory. Tutorial and laboratory material is developed in the C++ programming language; alongside the Raylib library for interactive graphics and sound.</p> <p>This module will work to develop a number of the key 'I am UWS' Graduate Attributes. Of those attributes, this module will focus on making those who complete this module: Universal (Critical Thinker & Research-minded); Work Ready. (Problem-Solver, Effective Communicator & Digitally Literate); and Successful (Autonomous, Imaginative & Resilient).</p>			

Module Delivery Method					
Face-To-Face	Blended	Fully Online	HybridC	Hybrid 0	Work-Based Learning
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
See Guidance Note for details:					
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) (tick as appropriate)

Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Add name

Term(s) for Module Delivery

(Provided viable student numbers permit).

Term 1	Term 2	Term 3
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Learning Outcomes: (maximum of 5 statements)

These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.

At the end of this module the student will be able to:

L1	Demonstrate an understanding of current strands in artificial intelligence applied to videogames.
L2	Investigate, via programming, the techniques covered in the course.

L3	Select an appropriate technique for any desired aspect of intelligence.
L4	Apply these techniques within software relevant to videogame development.
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)	<p>SCQF Level 9</p> <p>Demonstrate an understanding of the scope and defining features of artificial intelligence within the domain of computer games; along with an integrated knowledge of its main areas and boundaries.</p> <p>Show a critical understanding of a range of the principles, principal theories, concepts and terminology of computer game AI.</p>
Practice: Applied Knowledge and Understanding	<p>SCQF Level 9</p> <p>Apply knowledge in using a range of algorithms, libraries, development tools, and development methodologies associated with the domain of computer games.</p> <p>Apply skills and understanding to techniques, practices and materials that are specialised and advanced.</p>
Generic Cognitive skills	<p>SCQF Level 9</p> <p>Undertake critical analysis, evaluation and synthesis of ideas, concepts, information and issues in solving real-world game AI problems within interactive graphical environments. You will draw on a range of source in making judgements including contemporary library materials, and online resources.</p>
Communication, ICT and Numeracy Skills	<p>SCQF Level 9</p> <p>Use and develop C++ programming skills while completing laboratory exercises. Develop written communication skills via the submission of a formal report, incorporating graphical results, for set assignments on specific AI problems relevant to videogames.</p>
Autonomy, Accountability and Working with others	<p>SCQF Level 9</p> <p>Exercise autonomy and initiative in the completion of set assignments for a deadline. Through a group assignment, you will practise in ways that show awareness of your own and others' roles and responsibilities.</p>
Pre-requisites:	Before undertaking this module the student should have undertaken the following:

	Module Code:	Module Title:
	Other:	C++
Co-requisites	Module Code:	Module Title:

*Indicates that module descriptor is not published.

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 (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	24
Laboratory/Practical Demonstration/Workshop	24
Asynchronous Class Activity	50
Independent Study	102
	200 Hours Total
**Indicative Resources: (eg. Core text, journals, internet access)	
<p>The following materials form essential underpinning for the module content and ultimately for the learning outcomes:</p> <p>Millington, I. (2019) AI for Games (Third Edition), CRC Press</p> <p>Rabin S. ed. (2013,2015,2017) Game AI Pro (1-3): Collected Wisdom of Game AI Professionals, AK Peters/CRC Press</p> <p>Russell S. and Norvig P. (2016) Artificial Intelligence: A Modern Approach, Pearson</p>	

(**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:

Students are expected to attend the on campus weekly teaching sessions. A record of attendance is kept, and timely submission of assignments is expected.

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](#).

Please ensure any specific requirements are detailed in this section. Module Co-ordinators should consider the accessibility of their module for groups with protected characteristics..

(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
Assessment Results (Pass/Fail)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
School Assessment Board	Creative Computing
Moderator	Thomas Hainey
External Examiner	N Whitton
Accreditation Details	This module is accredited by BCS and TIGA as part of a number of specified programmes.
Changes/Version Number	2.11

Assessment: (also refer to Assessment Outcomes Grids below)

The course is assessed using two coursework assignments (worth 30% and 40% respectively); and one closed-book class test (worth 30%).

Assessment 1 - Coursework provided as a set industry-relevant problem relating to material covered in the first three weeks of the module. The coursework requires the submission of a written report, along with a substantial piece of well-engineered software; created using the course programming language. The coursework is set to be completed in groups. The first coursework is worth 30% of the final overall mark for the module.

Assessment 2 - The second assessment is a coursework provided as a set industry-relevant problem relating to material covered in weeks 5 to 9 of the module. The coursework requires the submission of a written report, along with a substantial piece of well-engineered software; created using the course programming language. The coursework is set to be completed in groups. The second coursework is worth 40% of the final overall mark for the module.

Assessment 3 - The third and final assessment is a closed-book class test, comprised of questions drawn from any topic covered during the module. The class test is worth 30% of the final overall mark for the module.

(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.)

Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Report of practical/ field/ clinical work		✓	✓	✓		30	0

Component 2							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Report of practical/ field/ clinical work		✓	✓	✓		40	0

Component 3							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Class test (practical)	✓		✓			30	1
Combined Total for All Components						100%	1 hour