

<b>Module code: MOD006109</b>	<b>Version: 1 Date Amended: 12/Jan/2018</b>
<b>1. Module Title</b>	
Artificial Intelligence for Games	
<b>2a. Module Leader</b>	
Senir Dinar	
<b>2b. School</b>	
Cambridge School of the Creative Industries	
<b>2c. Faculty</b>	
Faculty of Arts, Humanities and Social Sciences	
<b>3a. Level</b>	
6	
<b>3b. Module Type</b>	
Standard (fine graded)	
<b>4a. Credits</b>	
15	
<b>4b. Study Hours</b>	
150	

5. Restrictions			
Type	Module Code	Module Name	Condition
Pre-requisite:	MOD006101	Object-Oriented Programming for Games	Compulsory
Pre-requisite:	MOD006100	Game Engine Technology: Systems Modelling	Compulsory
Co-requisites:	None		
Exclusions:	None		
<b>Courses to which this module is restricted:</b>	U0198FCAM01 Computer Gaming Technology BSc FT U0817SCAM01 Computer Gaming Technology (with placement) BSc SW U0163FCAM01 Computer Gaming Technology (extended) BSc -FT		

## LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description
<p>Artificial Intelligence (AI) is a field of automated and rational decision making that is pervasive in many areas of computer science including the area of video game development. AI in games differs from other more traditional applications of the field given the need to build systems that govern and direct players for the purposes of entertainment, rather than optimality.</p> <p>This module covers both the foundational theory of AI decision making and examines the tools, techniques and practices to achieve common requirements of the video game industry. This looks creation of pathfinding agents, responding to stimuli and changing behaviour via finite state machines and behaviour trees, long-term planning and decision making, 'director' management systems and Procedural Content Generation (PCG). There will also be a brief overview of the new trends in computational intelligence as and when they become more prevalent in industry. All topics are supported by case studies of applications of these techniques within the video game industry and will expect students to engage in sessions where we deconstruct well-known AI implementations in commercial games.</p>

## 6b. Outline Content

- Foundational AI theory of rational agents and decision making.
  - State-space models, (un) informed search algorithms.
- Player movement through use of pathfinding models of virtual space.
  - Models of encoding virtual spaces for purposes of search.
  - A\*, D\* Lite, Jump Point Search.
  - Use of navigation meshes in commercial game-engines.
- Use of Finite State Machines and Behaviour Trees to create intelligent non-player characters.
  - Finite State Machines and Hierarchical-Finite State Machines.
  - Behaviour Trees, Stimulus Injections
- Planning techniques for long-term decision making.
- Director AI systems for scaled and responsive video game experiences.
- Procedural content generation techniques for generating levels, characters, rules, quests and stories.
- Computational intelligence approaches for 'anytime' decision making.

## 6c. Key Texts/Literature

The reading list to support this module is available at: <http://readinglists.anglia.ac.uk/modules/mod006109>

## 6d. Specialist Learning Resources

Access to the internet and Anglia Ruskin University LMS. Software development tools for programming in a high-level language (such as: C#, C++, Java and AI language toolkits) available as a standard resource in departmental labs and for free either directly or through the Microsoft Academic Alliance scheme. Access to a specialist programmable interactive environment (i.e. game engines).

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	Synthesis and Appraise the theoretical underpinnings of artificial intelligence and how these are implemented to provide intelligent behaviour.
2	Knowledge and Understanding	Critically assess the relative strengths and weaknesses of artificial intelligence techniques for games and how best to utilise them.
3	Intellectual, practical, affective and transferrable skills	Implement and develop AI based techniques to solve problems in interactive environments.
4	Intellectual, practical, affective and transferrable skills	Critically evaluate the validity and suitability of an AI solution for a given problem domain.

8a. Module Occurrence to which this MDF Refers				
Year	Occurrence	Period	Location	Mode of Delivery
2019/0	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	12	1-3	1 hr Lecture x 12 weeks
Other teacher managed learning	24	3-4	2 hrs Practical laboratory session x 12 weeks
Student managed learning	114	1-4	Self-directed learning
TOTAL:	150		

9. Assessment for the above Module Occurrence					
Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
010	Coursework	1-4	100 (%)	Fine Grade	30 (%)
<b>An AI enhanced game artefact, equivalent to 2500 words and a short report equivalent to 500 words.</b>					

**In order to pass this module, students are required to achieve an overall mark of 40%.**

**In addition, students are required to:**

**(a) achieve the qualifying mark for each element of fine graded assessment of as specified above**

**(b) pass any pass/fail elements**