Module Specification

Module Summary Information

1	**Module Title**	Artificial Intelligence for Games
2	**Module Credits**	20
3	**Module Level**	6
4	**Module Code**	CMP6206

5	**Module Overview**

Artificial intelligence is concerned with the goal of building intelligent computing machines. It is multi-disciplinary and as such spans several other subjects, such as computer science (of which it is often viewed to be part), robotics, economic behaviour, psychology. AI techniques are also employed in the rapidly expanding field of predictive analytics in data mining. A good grasp of mathematical reasoning and logic is important therefore, and the study of the topics presented here will help further develop these skills.

Advances in visualization technology have enabled games developers to produce visually compelling, realistic and challenging computer games. These advances in game aesthetics allow further improvements to be made in game design and logic. For this developers need a range of deterministic and non-deterministic techniques, the latter normally associated with the field of artificial intelligence, to imbue games characters with behaviours and strategies which give the illusion of intelligence.

Topics covered within this module include a range of techniques in artificial intelligence: basic mathematics for games, particularly in the field of two-dimensional and three dimensional geometry; movement in computer games which give the illusion of intelligence, such as seeking, fleeing, wandering, steering, obstacles, object intersection and collision avoidance; game physics: aiming and shooting, projectiles, targeting, predator / prey dynamics. Game and game actor states as modelled by finite-state machines, both deterministic and non-deterministic.

More advanced techniques such as game theory for optimising play and decision strategy, and biologically-inspired behaviour such as flocking and emergence, pattern recognition using artificial neural networks and genetic algorithms will also be covered.

6	**Indicative Content**

- Finite State Machines and Behaviour Trees
- Sensors and Agents
- Path Finding (Informed and Uninformed)
- Tree Searching
- Flocking and Crowds
- Decision Making
- Fuzzy Logic
- Neural Networks
- Reinforcement Learning
- Genetic Algorithms

7	Module Learning Outcomes On successful completion of the module, students will be able to:	
	1	Demonstrate competence in basic mathematics and physics for games, particularly in the field of two-dimensional and three dimensional geometry, and Newtonian mechanics
	2	Solve problems associated with game AI techniques, such as searching, autonomous movement, state-driven game agent behaviour
	3	Demonstrate competence in using advanced AI techniques such as fuzzy logic, uncertain reasoning, path finding and state managers
	4	Develop complete or partial computer games which incorporate character behaviour and strategies informed by deterministic and non-deterministic game AI techniques

8	Module Assessment		
Learning Outcome			
	Coursework	**Exam**	**In-Person**
1-4	X		

9	Breakdown Learning and Teaching Activities
Learning Activities	**Hours**
Scheduled Learning (SL) includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable	48
Directed Learning (DL) includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE	92
Private Study (PS) includes preparation for exams	60
Total Study Hours:	200