



**MONASH** University  
Information Technology

**FIT3094**  
**AI for gaming**

**Unit Guide**

**Semester 1, 2012**

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

*Last updated: 22 Feb 2012*

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# **FIT3094 AI for gaming - Semester 1, 2012**

This unit will introduce Artificial Intelligence (AI) techniques that can be used in games development. General capabilities of AI technology, behaviours/circumstances that need to be simulated/learned/reproduced by the smart non-player characters/environments in smart games, AI techniques (such as evolutionary and neural computations) used in the development of smart games will be discussed at length. This unit will build upon previous programming skills, and provide a strong grounding for further study in this area, especially related to games engine development. The unit will examine intelligent game creation using C++.

## **Mode of Delivery**

Caulfield (Day)

## **Contact Hours**

2 hrs lectures/wk, 2 hrs laboratories/wk

## **Workload**

Students will be expected to spend a total of 12 hours per week during semester on this unit as follows:

- a two hour lecture
- a two hour laboratory session

and up to an additional 8 hours in some weeks for completing lab and project work, private study and revision.

## **Unit Relationships**

### **Prerequisites**

FIT2049

### **Chief Examiner**

Dr Alan Dorin

### **Campus Lecturer**

### **Caulfield**

**Alan Dorin: Consultation hours: 3-4pm, Thursday by arrangement during labs & lectures or email**

## **Tutors**

### **Caulfield**

**Alan Dorin**

# Academic Overview

## Outcomes

At the completion of this unit students will have:

- an ability to select and use various Artificial Intelligence techniques to build intelligent games;
- an understanding of the general capabilities of Artificial Intelligence (AI) technologies;
- an understanding of the possible opportunities where intelligence can be applied in the game development world;
- an ability to apply AI techniques in building games that challenge the players by learning/adapting to their style over time and thereby developing new strategies to take the games into the next level;
- an ability to evaluate the suitability of AI techniques in the development of various games;
- enthusiasm for the endless possibilities that AI technologies can enrich the game development world;
- motivation to develop further skills in AI techniques for games development;
- appreciation and open-mindedness that better collaborations between the game development industry and the academic AI research will open wider opportunities in the enhancements of smart games;
- skills in developing smart games using AI techniques;
- ability to design, develop and debug game applications written in C++;
- create interactive (2D and 3D) smart game environment that displays the AI techniques learnt in the unit;
- ability to engage in technical discussions on AI technologies for games.

## Graduate Attributes

Monash prepares its graduates to be:

1. responsible and effective global citizens who:

- a. engage in an internationalised world
- b. exhibit cross-cultural competence
- c. demonstrate ethical values

critical and creative scholars who:

- a. produce innovative solutions to problems
- b. apply research skills to a range of challenges
- c. communicate perceptively and effectively

## Assessment Summary

Examination (2 hours): 60%; In-semester assessment: 40%

Assessment Task	Value	Due Date
Non-Player Character Game Controller	20%	Week 7, 20 April 2012, 6pm
Coordinated Non-Player Character Game Controller	20%	

Examination 1

60%

To be advised

## Teaching Approach

- **Lecture and tutorials or problem classes**

This teaching and learning approach provides facilitated learning, practical exploration and peer learning.

- **Laboratory-based classes**

This teaching approach is practical learning.

## Feedback

### Our feedback to You

Types of feedback you can expect to receive in this unit are:

- Informal feedback on progress in labs/tutes
- Graded assignments with comments

### Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through SETU, Student Evaluation of Teacher and Unit. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, and on student evaluations, see:

<http://www.monash.edu.au/about/monash-directions/directions.html>

<http://www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html>

## Previous Student Evaluations of this unit

The lecture notes and tutorial material now provide further detail on vector arithmetic for applications in steering behaviour computation.

If you wish to view how previous students rated this unit, please go to

<https://emuapps.monash.edu.au/unitevaluations/index.jsp>

## Required Resources

Please check with your lecturer before purchasing any Required Resources. Prescribed texts are available for you to borrow in the library, and prescribed software is available in student labs.

## Academic Overview

On-campus students may use the software which is installed in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook.

You will need access to:

- Current C++ compiler (e.g. GNU)
- Current OpenGL and GLUT libraries
- Unix-based operating system (e.g. Linux, BSD, MacOS X)

## Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Introduction to Artificial Intelligence (AI)	
2	Introduction to Artificial Life (AL)	
3	History of AI and AL	
4	The interactive game loop, Finite State Machines	
5	Neural Networks	
6	Mid-course revision	
7	Vectors and Steering Behaviour, Introduction to Search Algorithms	Assignment 1 due Week 7, 20 April 2012, 6pm
8	Cooperative strategies for agent behaviour	
9	Growing plants and forests intelligently and realistically	
10	A* Search algorithm	
11	Artificial Evolution	
12	Virtual Ecosystems	Assignment 2 due Week 12, 25 May 2012, 6pm
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: <a href="http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html">http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html</a>

\*Unit Schedule details will be maintained and communicated to you via your MUSO (Blackboard or Moodle) learning system.

# Assessment Requirements

## Assessment Policy

Faculty Policy - Unit Assessment Hurdles

(<http://www.infotech.monash.edu.au/resources/staff/edgov/policies/assessment-examinations/unit-assessment-hu>)

## Assessment Tasks

### Participation

- **Assessment task 1**

**Title:**

Non-Player Character Game Controller

**Description:**

Write an intelligent game controller for a non-player character. Your controller will be pitted against those of your class-mates in a mass-game as part of the assessment process. A detailed document describing what is required will be distributed to students via the online materials.

**Weighting:**

20%

**Criteria for assessment:**

You will be assessed on how efficiently you write the software and on how well your controller plays the game including how frequently it hits and sinks other ships and how infrequently it is hit itself.

Please consult the detailed online document that will be provided for further info.

**Due date:**

Week 7, 20 April 2012, 6pm

- **Assessment task 2**

**Title:**

Coordinated Non-Player Character Game Controller

**Description:**

Write software to generate emergent group behaviour of non-player characters. A detailed document describing what is required will be distributed to students via the online materials.

**Weighting:**

20%

**Criteria for assessment:**

You will be assessed on how efficiently you write the software and on how well your controller plays the game including how frequently it hits and sinks other ships in a coordinated strategy with its allies and on how infrequently it is hit itself, especially by its allies.

Please consult the detailed online document that will be provided for further info.

**Due date:**

Week 12, 25 May 2012, 6pm

## Examinations

### • Examination 1

**Weighting:**

60%

**Length:**

2 hours

**Type (open/closed book):**

Closed book

**Electronic devices allowed in the exam:**

None

## Assignment submission

It is a University requirement

(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-procedures.html>) for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at <http://www.infotech.monash.edu.au/resources/student/forms/>. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an online quiz).

## Online submission

If Electronic Submission has been approved for your unit, please submit your work via the VLE site for this unit, which you can access via links in the my.monash portal.

## Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.

You must negotiate any extensions formally with your campus unit leader via the in-semester special consideration process:

<http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html>.

## Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

## Other Information

### Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:

<http://policy.monash.edu.au/policy-bank/academic/education/index.html>

Key educational policies include:

- Plagiarism  
(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-policy.html>)
- Assessment  
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-p>)
- Special Consideration  
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.h>)
- Grading Scale  
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html>)
- Discipline: Student Policy  
(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html>)
- Academic Calendar and Semesters (<http://www.monash.edu.au/students/key-dates/>);
- Orientation and Transition (<http://www.infotech.monash.edu.au/resources/student/orientation/>);  
and
- Academic and Administrative Complaints and Grievances Policy  
(<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy>)
- Codes of Practice for Teaching and Learning  
(<http://www.policy.monash.edu.au/policy-bank/academic/education/conduct/suppdocs/code-of-practice-tea>)

### Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at [www.monash.edu.au/students](http://www.monash.edu.au/students). For Sunway see <http://www.monash.edu.my/Student-services>, and for South Africa see <http://www.monash.ac.za/current/>

The Monash University Library provides a range of services and resources that enable you to save time and be more effective in your learning and research. Go to <http://www.lib.monash.edu.au> or the library tab in my.monash portal for more information. At Sunway, visit the Library and Learning Commons at <http://www.lib.monash.edu.my/>. At South Africa visit <http://www.lib.monash.ac.za/>.

Academic support services may be available for students who have a disability or medical condition. Registration with the Disability Liaison Unit is required. Further information is available as follows:

- Website: <http://monash.edu/equity-diversity/disability/index.html>;
- Email: [dlu@monash.edu](mailto:dlu@monash.edu)
- Drop In: Equity and Diversity Centre, Level 1 Gallery Building (Building 55), Monash University, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Sunway Campus
- Telephone: 03 9905 5704, or contact the Student Advisor, Student Community Services at 03 55146018 at Sunway

Other Information

## **Reading list**

No prescribed text is required. Recommended reading lists will appear each week with the lecture notes.

## **Other**

### **Some useful web resources**

[www.ai-depot.com](http://www.ai-depot.com)

[www.generation5.org](http://www.generation5.org)

[www.ai-junkie.com](http://www.ai-junkie.com)

[www.gamedev.net](http://www.gamedev.net)