



MONASH University
Information Technology

FIT3094
AI for gaming

Unit Guide

Semester 1, 2013

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.

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FIT3094 AI for gaming - Semester 1, 2013

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 requirements

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, Wednesday by arrangement during labs & lectures or email

Tutors

Caulfield

Alan Dorin

Zoe Bukovac

Academic Overview

Learning 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.

Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Introduction to Artificial Intelligence (AI) & Artificial Life (AL)	
2	A History of AI and AL in Games	
3	Basic Search Algorithms, their significance for AI and AL	
4	The Interactive Game Loop, Finite State Machines and Agent Decisions	
5	Vectors and Steering Behaviour	
6	Cooperative strategies for agent behaviour	
7	Mid-semester revision and assignment discussion	Assignment 1 due Week 7, 26 April 2013, 6pm
8	Growing plants and forests intelligently and realistically	
9	Artificial Evolution	
10	Virtual Ecosystems	
11	Advanced Search Algorithms: A* Search	
12	Neural Networks	Assignment 2 due Week 12, 31 May 2013, 6pm
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html

*Unit Schedule details will be maintained and communicated to you via your learning system.

Assessment Summary

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

Assessment Task	Value	Due Date
Assignment 1 - Non-Player Character Game Controller	20%	Week 7, 26 April 2013, 6pm
Assignment 2 - Coordinated Non-Player Character Game Controller	20%	Week 12, 31 May 2012, 6pm
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.

Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles

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

Academic Integrity - Please see the Demystifying Citing and Referencing tutorial at

<http://lib.monash.edu/tutorials/citing/>

Assessment Tasks

Participation

• Assessment task 1

Title:

Assignment 1 - 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, 26 April 2013, 6pm

• Assessment task 2

Title:

Assignment 2 - 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:

Examinations

- **Examination 1**

Weighting:

60%

Length:

2 hours

Type (open/closed book):

Closed book

Electronic devices allowed in the exam:

None

Learning resources

Reading list

No prescribed text is required. Recommended reading lists will appear each week with the lecture notes. Video materials covering some background aspects of the course will also be available.

Monash Library Unit Reading List

<http://readinglists.lib.monash.edu/index.html>

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

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.

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 learning system for this unit, which you can access via links in the my.monash portal.

Required Resources

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

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)

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:

www.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 in Coursework Programs;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-po>
- Special Consideration;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.ht>
- 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/dates/>
- Orientation and Transition; <http://intranet.monash.edu.au/infotech/resources/students/orientation/>
- Academic and Administrative Complaints and Grievances Policy;
<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy.h>
- Code of Practice for Teaching and Learning;
<http://www.policy.monash.edu.au/policy-bank/academic/education/conduct/suppdocs/code-of-practice-teac>

Graduate Attributes Policy

<http://www.policy.monash.edu/policy-bank/academic/education/management/monash-graduate-attributes-policy.h>

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 <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/>.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research. Go to 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/>.

Disability Liaison Unit

Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis.

Website: <http://www.monash.edu/equity-diversity/disability/index.html> Telephone: 03 9905 5704 to book an appointment with a DLO; or contact the Student Advisor, Student Community Services at 03 55146018 at Sunway Email: dlu@monash.edu Drop In: Equity and Diversity Centre, Level 1, Building 55, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Sunway Campus

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 the Student Evaluation of Teaching and Units (SETU) survey. 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, see:

www.monash.edu.au/about/monash-directions and on student evaluations, see: www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this Unit

Previous feedback has highlighted that the unit's assignments are considered to be exciting and engaging for students.

Previous feedback has also indicated that vector arithmetic was in need of greater coverage. Hence, 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>

Other

Some useful web resources

www.ai-depot.com
www.generation5.org
www.ai-junkie.com
www.gamedev.net