WESTERN SYDNEY
UNIVERSITY

School of Computer, Data and Mathematical Sciences

Learning Guide

300862 Video Games Development
Spring 2020

Unit Details

Unit Code:	300862
Unit Name:	Video Games Development
Credit Points:	10
Unit Level:	3
Assumed Knowledge:	Understanding of programming concepts and details of programming. Good programming skills in C#, Java or C++. Knowledge of systems analysis methods including object orientated analysis and design. Basic knowledge of vector algebra, matrixes and fundamentals of mathematics.

Note: Students with any problems, concerns or doubts should discuss those with the Unit Coordinator as early as they can.

Unit Coordinator

Name: Anton Bogdanovych
Phone: 9685 9180
Location: Parramatta South, ER 1.14
Email: a.bogdanovych@westernsydney.edu.au
Consultation Arrangement:
By appointment via email.

Teaching Team

Name: Dean Preston
Email: D.Preston@westernsydney.edu.au
Consultation Arrangement:
by appointment

Edition: Spring 2020

Contents

Note: The relevant Learning Guide Companion supplements this document

1 About Video Games Development

1.1 An Introduction to this Unit

This unit provides students with an in-depth understanding of the development and structure of game engines. It provides the student with a unifying overview of the many modules that are incorporated in a game engine as well as a detailed examination of game-play and engine programming.

1.2 What is Expected of You

Study Load

A student is expected to study an hour per credit point a week. For example a 10 credit point unit would require 10 hours of study per week. This time includes the time spent within classes during lectures, tutorials or practicals.

Attendance

It is strongly recommended that students attend all scheduled learning activities to support their learning.

Online Learning Requirements

Unit materials will be made available on the unit's vUWS (E-Learning) site (https://vuws.westernsydney.edu.au/). You are expected to consult vUWS at least twice a week, as all unit announcements will be made via vUWS. Teaching and learning materials will be regularly updated and posted online by the teaching team.

Special Requirements

Essential Equipment:
Not Applicable
Legislative Pre-Requisites:
Not Applicable

Policies Related to Teaching and Learning
The University has a number of policies that relate to teaching and learning. Important policies affecting students include:

- Assessment Policy
- Bullying Prevention Policy and
- Guidelines
- Enrolment Policy
- Examinations Policy
- Review of Grade Policy
- Sexual Harassment Prevention Policy
- Special Consideration Policy
- Student Misconduct Rule
- Teaching and Learning - Fundamental Code
- Student Code of Conduct

Academic Integrity and Student Misconduct Rule
In submitting assessments, it is essential that you are familiar with the policies listed above and that you understand

the principles of academic integrity. You are expected to act honestly and ethically in the production of all academic work and assessment tasks, submit work that is your own and acknowledge any contribution to your work made by others.

Important information about academic integrity, including advice to students is available at https://www.westernsydney.edu.au/studysmart/home/academic_integrity_and_plagiarism. It is your responsibility to familiarise yourself with these principles and apply them to all work submitted to the University as your own.

When you submit an assignment or product, you will declare that no part has been: copied from any other student's work or from any other source except where due acknowledgement is made in the assignment; submitted by you in another (previous or current) assessment, except where appropriately referenced, and with prior permission from the Unit Coordinator; written/produced for you by any other person except where collaboration has been authorised by the Unit Coordinator.

The Student Misconduct Rule applies to all students of Western Sydney University and makes it an offence for any student to engage in academic, research or general misconduct as defined in the Rule.

The University considers plagiarism, cheating and collusion as instances of academic misconduct. The University also considers submitting falsified documentation in support of applications for special consideration, including sitting of deferred examinations, as instances of general misconduct. You should be aware that changes were made to the Student Misconduct Rule commencing 1 January 2020 that provide for minimum sanctions that apply to certain conduct, including the provision of falsified documentation to the University.

You are strongly advised to read the Student Misconduct Rule and the Inappropriate Behaviour Guidelines at the commencement of each session to familiarise yourself with this process and the expectations of the University in relation to work submitted for assessment.

1.3 Changes to Unit as a Result of Past Student Feedback

The University values student feedback in order to improve the quality of its educational programs. The feedback provided helps us improve teaching methods and units of study. The survey results inform unit content and design, learning guides, teaching methods, assessment processes and teaching materials.

You are welcome to provide feedback that is related to the teaching of this unit. At the end of the semester you will be given the opportunity to complete a Student Feedback on Unit (SFU) questionnaire to assess the unit. You may also have the opportunity to complete a Student Feedback on Teaching (SFT) questionnaire to provide feedback for individual teaching staff.

As a result of student feedback, the following changes and improvements to this unit have recently been made:

- Lectures have been updated in line with new developments in the field

2 Assessment Information

2.1 Unit Learning Outcomes

This unit is concerned with the provision of an in-depth understanding of the development and structure of game engines. It provides the student with a unifying overview of the many modules that are incorporated in a game engine as well as a detailed examination of game-play and engine programming. It will also focus on major theoretical concepts and algorithms that are currently being used in games development. After completing this unit the students will understand how game engines are built and will be able to use a selected game engine for building their own game.

	Outcome
1	Explain the fundamental concepts behind computer game engines
2	Understand the technological details behind various modules that comprise a game engine
3	Write basic modules to interface with a game engine
4	Design modules to meet a given set of requirements
5	Develop their own game using the selected game engine

2.2 Approach to Learning

What is expected of you? This unit is a 10-credit point unit. It is expected that you spend 10 hours each week working on this unit. The face-to-face component of this unit is a two (2) hour lecture each week and a two (2) hour practical each week. This means that, provided you work efficiently in the face-to-face teaching/learning time, you are expected to spend an additional 6 hours each week working on material for this subject, including reading the textbook and other references, undertaking tutorial/homework exercises, working on assignments, reviewing lecture material, reflecting on your learning and preparing for the final exam.

2.3 Contribution to Course Learning Outcomes

3506: Bachelor of Computer Science

Course Learning Outcomes	ULO 1	ULO 2	ULO 3	ULO 4	ULO 5
1. Communicate in a professional manner with others at all levels within and beyond the industry and across discipline, cultural and national boundaries, orally, in writing and through presentations.	Developed	Developed			
2. Perform work of high quality with an awareness of the professional code of conduct, professional and personal ethics, and the legal and social implications of technological change and professional practice	Developed	Developed	Developed	Developed	Developed
3. Work independently and as a member of a team, including cross-discipline teams, and plan, manage and report on personal and project deliverables	Developed	Developed	Developed	Developed	Developed
4. Plan, implement and monitor systems to provide appropriate and ongoing quality assurance in respect to all work undertaken	Introduced	Introduced			
5. Demonstrate an understanding of a variety of computer systems, their capabilities and limitations	Introduced	Introduced			

3639: Bachelor of Information and Communications Technology

Course Learning Outcomes	ULO 1	ULO 2	ULO 3	ULO 4	ULO 5
1. Explain the complex networks involved when dealing with people, business and government in the context of ICT development, support and service provision.					
2. Evaluate the technological and software core of ICT theory and practice analysing and designing applications	Introduced	Introduced			
3. Apply the knowledge and skills required for the development of new applications and new application areas	Developed	Developed	Developed	Developed	Developed
4. Innovate by keeping up to date with the rapid development in technology and practice across the ICT domain, as an extension of their current understandings and the ability to find innovative ICT solutions and move the ICT field forward.	Introduced	Introduced			

5. Perform work of high quality with an awareness of the professional code of conduct, professional and personal ethics, and the legal and social implications of technological change relating to privacy of information and professional practice.					

3687: Bachelor of Information Systems

Course Learning Outcomes	ULO 1	ULO 2	ULO 3	ULO 4	ULO 5
1. Communicate in a professional manner with others at all levels within and beyond the industry and across discipline, cultural and national boundaries, orally, in writing and through presentations.	Introduced	Introduced			
2. Understand the importance of a strong synergies between people, processes and selected technologies.		Introduced			
3. Research, plan, implement and monitor systems to provide appropriate and ongoing quality assurance in respect to all work undertaken according to current standards in the computing industry.					
4. Perform work of high quality with an awareness of the professional code of conduct, professional and personal ethics, and the legal and social implications of technological change and professional practice	Developed	Developed	Developed	Developed	Developed
5. Work independently and as a member of a team, including cross-discipline teams, and plan, manage and report on personal and project deliverables	Developed	Developed	Developed	Developed	Developed
6. Innovate, research and look for new technologies and tools that can assist businesses when implementing cutting edge information systems.	Introduced	Introduced			

2.4 Assessment Summary

The assessment items in this unit are designed to enable you to demonstrate that you have achieved the unit learning outcomes. Completion and submission of all assessment items which have been designated as mandatory or compulsory is essential to receive a passing grade.

To pass this unit you must:

To pass this unit you must: a) Achieve a mark of at least 50% overall b) Complete and submit all the assessment activities; (Failure to submit all components without approval from the unit coordinator may result in a Fail Non Submission (FNS) grade).

Item	Weight	Due Date	ULOs Assessed	Threshold
Tutorials	10%	Weeks 3 and Week 7 during the allocated tutorial class	3, 4, 5	No
Assignment 1	10%	21 August, 23:59	1, 2	No
Assignment 2	30%	19 October (during the demonstration day), should be ready by 9 AM	3, 4, 5	No
Final Examination	50%	In the scheduled formal examination period.	1, 2, 3, 4	No

Feedback on Assessment

Feedback is an important part of the learning process that can improve your progress towards achieving the learning outcomes. Feedback is any written or spoken response made in relation to academic work such as an assessment task, a performance or product. It can be given to you by a teacher, an external assessor or student peer, and may be given individually or to a group of students. As a Western Sydney University student, it is your responsibility to seek out and act on feedback that is provided to you as a resource to further your learning.

Electronic feedback will be sent as soon as practically possible via vUWS. Verbal feedback will also be provided in the tutorial classes. Assignment feedback with be given within two weeks of submission.

2.5 Assessment Details

2.5.1 Tutorials

Weight:	10%
Type of Collaboration:	Individual
Due:	Weeks 3 and Week 7 during the allocated tutorial class
Submission:	Submitted in the tutorial class
Format:	These are Unity tutorials that teach you the necessary game development fundamentals using the Unity package. The tutorials are supplied in a form of a software package that you must download and install on your computer. Each tutorial results in a mini game component being created. In week 3 you must present part 1: one unity tutorial completed by yourself individually (no group work). For part 1 you can select one of the tutorials that is closest in its style to the game you are planning to build. In week 7 you would have to present part 2: a tutorial completed within your game (further instructions will be provided in class). The weights of part 1 and part 2 are 50% each.
Length:	7 weeks
Curriculum Mode:	Practical

A Unity tutorial will be supplied with step-by-step instructions in the corresponding documents. Your tutor is the first point of contact in case you have any questions. Your game component will be assessed in the tutorial class by your tutor. You must attend the corresponding tutorial classes to demonstrate your tutorial submissions.

Resources:

All the associated resources will be provided in vUWS.

Marking Criteria:

Criteria	High Distinction	Distinction	Credit	Pass	Unsatisfactory
You have to follow the instructions in the corresponding document for part 1 and tutor instructions for part 2, complete the Unity tutorial and present it in your tutorial class.	You have correctly completed over 85% of the tasks specified in the tutorial.	You have correctly completed over 75% of the tasks specified in the tutorial.	You have correctly completed over 65% of the tasks specified in the tutorial.	You have correctly completed over 50% of the tasks specified in the tutorial.	You have completed below 50% of the tasks specified in the tutorial.

2.5.2 Assignment 1

Weight:	10%
Type of Collaboration:	Both (Individual & Group)
Due:	21 August, 23:59
Submission:	Submitted via vUWS
Format:	Assignment 1 is the game concept document. It is to be submitted in the form of a Microsoft Word or Adobe PDF file.
Length:	5 weeks to complete
Curriculum Mode:	Proposal

All necessary instructions will be available on vUWS and will be discussed in the tutorial and during lectures

Resources:

The vUWS site will provide examples of game concept documents and a concept document template. Lecture 1 will discuss the issues associated with developing a game concept.

Marking Criteria:

This assignment represents a game proposal document. The proposal will be judged based on the quality of the game concept and the completeness of the document. Note that group projects are allowed (up to 2 students in the group), but the expected amount of work for group projects must be double the amount of work expected for individual projects. So, group proposals are expected to be more detailed than individual ones and have artwork, interface elements included. It is hard to explicitly provide mark boundaries for game proposals, but examples of proposals that received HD will be provided on the vUWS site and other relevant marking aspects will be discussed in the tutorial.

This assignment will be used together with Assignment 2. The game you develop in Assignment 2 should closely match the concept document presented in Assignment 1. Points may be deducted if this does not happen.

2.5.3 Assignment 2

Weight:	30%
Type of Collaboration:	Both (Individual & Group)
Due:	19 October (during the demonstration day), should be ready by 9 AM
Submission:	You must present in person and submit your game on vuws before the demonstration day
Format:	3 minute presentation + Unity files submitted online
Length:	Requires a number of weeks to complete
Curriculum Mode:	Presentation

Resources:

All the associated resources will be provided in vUWS.

Marking Criteria:

Criteria	High Distinction	Distinction	Credit	Pass	Unsatisfactory
You must develop a complete game using the Unity package. The code of the game must be submitted on vuws and presented during the demonstration day (week 14). A 30% deduction will apply for those who do not attend the demonstration day. The key requirement that affects your mark is your game is complete, meaning that it's a fully playable game. The second most important element is that the game is of substantial complexity (a game which required a significant input from each team member). The more team members you have the more effort is expected. A game created by 2 people is expected to attract twice as much effort from developers. Please regularly consult with your tutor and check whether the level of complexity of your game meets the expectations. The third most important criteria is that the game must be fun to play. Your tutor is able to asses your game concept and implementation in relation to meeting this criteria.	A complete game of your chosen genre that features a compelling storyline and is fully functional. The game is fun to play. At least one game level is fully implemented (e.g. the terrain, Hud, player character, player controller, enemy, scene art are all finished and are of high quality). The game is of high complexity and has artistic appeal.	The game is fun to play almost complete, some insignificant elements are missing (e.g. Hud is not implemented). Despite elements missing the game is still fully functional and fully playable. It is also of moderate or high complexity and has artistic appeal.	The game is fully complete, but simple in its implementation, the game has very poor story and visual appeal or the game is moderately complex, but substantial elements are missing to make it complete (e.g. shooting enemies causes no damage).	The game is very simple in regards to implementation or the game is of moderate difficulty, but substantial elements of a game are not implemented to the degree that it is not a playable game (e.g. no enemies present in a shooter game).	The game is just a simple adaptation of a tutorial that you downloaded from the internet or the game is incomplete to the level that it is not playable.

2.5.4 Final Examination

Weight:	50%
Type of Collaboration:	Individual
Due:	In the scheduled formal examination period.
Submission:	At the examination
Format:	This is an open-ended exam that tests your understanding of the material presented in lectures. You will have to provide written answers to a set of open-ended questions.
Length:	2 hours
Curriculum Mode:	Short Answer

Exam instructions will be discussed in the last lecture.

Resources:

Use lecture notes and the textbook.

Marking Criteria:

Criteria	High Distinction	Distinction	Credit	Pass	Unsatisfactory
This will be a written closed-book exam that tests your understanding of the theoretical aspects of Video Games Development. It will cover the material presented in the lectures.	You have correctly supplied over 85% of the expected information.	You have correctly supplied over 75% of the expected information.	You have correctly supplied over 65% of the expected information.	You have correctly supplied over 50% of the expected information.	You have supplied under 50% of the expected information.

2.6 General Submission Requirements

Submission

- All assignments must be submitted by the specified due date and time.
- Complete your assignment and follow the individual assessment item instructions on how to submit. You must keep a copy of all assignments submitted for marking.

Turnitin

- The Turnitin plagiarism prevention system may be used within this unit. Turnitin is accessed via logging into vUWS for the unit. If Turnitin is being used with this unit, this means that your assignments have to be submitted through the Turnitin system. Turnitin from iParadigms is a web-based text-matching software that identifies and reports on similarities between documents. It is also widely utilised as a tool to improve academic writing skills. Turnitin compares electronically submitted papers against the following:
  - Current and archived web: Turnitin currently contains over 24 billion web pages including archived pages
  - Student papers: including Western Sydney University student submissions since 2007
  - Scholarly literature: Turnitin has partnered with leading content publishers, including library databases, text-book publishers, digital reference collections and subscription-based publications (e.g. Gale, Proquest, Emerald and Sage)

- Turnitin is used by over 30 universities in Australia and is increasingly seen as an industry standard. It is an important tool to assist students with their academic writing by promoting awareness of plagiarism.By submitting your assignment to Turnitin you will be certifying that:
  - I hold a copy of this assignment if the original is lost or damaged
  - No part of this assignment has been copied from any other student's work or from any other source except where due acknowledgement is made in the assignment
  - No part of the assignment has been written for me by any other person/s
  - I have complied with the specified word length for this assignment
  - I am aware that this work may be reproduced and submitted to plagiarism detection software programs for the purpose of detecting possible plagiarism (which may retain a copy on its database for future plagiarism checking).

Self-Plagiarising

- You are to ensure that no part of any submitted assignment for this unit or product has been submitted by yourself in another (previous or current) assessment from any unit, except where appropriately referenced, and with prior permission from the Lecturer/Tutor/Unit Co-ordinator of this unit.

Late Submission

- If you submit a late assessment, without receiving approval for an extension of time, (see next item), you will be penalised by 10% per day for up to 10 days. In other words, marks equal to 10% of the assignment's weight will be deducted from the mark awarded.
- For example, if the highest mark possible is 50, 5 marks will be deducted from your awarded mark for each late day.
- Saturday and Sunday are counted as one calendar day each.
- Assessments will not be accepted after the marked assessment task has been returned to students.
- This is consistent with Clause 51 of the Western Sydney University's Assessment Policy - Criteria and Standards-Based Assessment.

Extension of Due Date for Submission

Extensions are only granted in exceptional circumstances. To apply for an extension of time, locate an application form via the Western Sydney University homepage or copy the following link:
https://www.westernsydney.edu.au/currentstudents/current_students/forms

Application forms must be submitted to the Unit Coordinator/Convenor. Requests for extension should be made as early as possible and submitted within policy deadlines. Appropriate, supporting documentation must be submitted with the application. An application for an extension does not automatically mean that an extension will be granted. Assessments will not be accepted after the marked assessment task has been returned to students.

Resubmission

Resubmission of assessment items will not normally be granted if requested.

Application for Special Consideration

It is strongly recommended that you attend all scheduled learning activities to support your learning. If you have suffered misadventure, illness, or you have experienced exceptional circumstances that have prevented your attendance at class or your completion and submission of assessment tasks, you may need to apply for Special Consideration via the Western Sydney University website. http://www.westernsydney.edu.au/currentstudents/current_students/services_and_facilities/special_consideration2 or the Student Centre/Sydney City Campus Reception. Special Consideration is not automatically granted. It is your responsibility to ensure that any missed content has been covered. Your lecturer will give you more information on how this must be done.

3 Teaching and Learning Activities

Weeks	Topic	Assessments Due
Week 1 20-07-2020	Introduction to the field. History of Video Games. What Makes Games Fun?	
Week 2 27-07-2020	Understanding Game Engines	
Week 3 03-08-2020	Basics of Unity	- Tutorials
Week 4 10-08-2020	Mathematics for Games	
Week 5 17-08-2020	2D Games	- Assignment 1
Week 6 24-08-2020	Content Creation	
Week 7 31-08-2020	Rendering	- Tutorials
Week 8 07-09-2020	Animation	
Week 9 14-09-2020	Artificial Intelligence (part 1)	
Week 10 21-09-2020	Artificial Intelligence (part 2)	
Week 11 28-09-2020	Inter-session break	
Week 12 05-10-2020	Multiuser Games	
Week 13 12-10-2020	Physics	
Week 14 19-10-2020	Gaming Competition + Invited Lecture	- Assignment 2
Week 15 26-10-2020	STUVAC	

Weeks	Topic	Assessments Due
Week 16 02-11-2020		
Week 17 09-11-2020		

The above timetable should be used as a guide only, as it is subject to change. Students will be advised of any changes as they become known on the unit's vUWS site.

4 Learning Resources

4.1 Recommended Readings

Prescribed Textbook

Dalmau, D. S-C. (2004). Core techniques and algorithms in game programming. London, UK: Pearson Education.

Additional Reading

Adams, E., & Dormans, J. (2012). Game mechanics: advanced game design. Berkeley, CA: New Riders.

Burgun, K. (2012). Game design theory: a new philosophy for understanding games. Boca Raton, FL: CRC Press Inc.

Dunn, F., & Parberry, I. (2011). 3D math primer for graphics and game development. Boca Raton, FL: A K Peters/CRC Press.

Kirby, N. (2011). Introduction to game AI. Boston: Course Technology/Cengage Learning.

Lengyel, E. (2012). Mathematics for 3D game programming and computer graphics (3rd ed.). Boston, MA: Course Technology PTR.

Menard, M. (2012). Game development with unity. Boston, MA: Course Technology PTR.

Millington, I. (2009). Artificial intelligence for games. 2nd edn, San Francisco, CA: Elsevier.

Stahler, W. (2004). Beginning math and physics for game programmers. Indianapolis, IN: New Riders.