COMP3421 Computer Graphics - 2024

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General Course Information

Course Code : COMP3421
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Computer Science and Engineering
Delivery Mode : Multimodal
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate
Units of Credit : 6

Useful Links

[Handbook](#) [Class Timetable](#)

Course Details & Outcomes

Course Description

In this course, you will delve into the fundamentals and practical aspects of Computer Graphics by working with game engines. You will gain knowledge and skills in developing 2D, 3D, and Virtual Reality-based graphical objects and environments using game engines including Unreal

Engine and Unity. Additionally, you will understand computer graphics concepts, including lighting, reflection, static meshes, 2D Transforms, 3D Transforms, surface, texture maps, materials, cameras, object physical behaviors, collision detection, hierarchical modeling of objects, shaders, and rendering.

The objectives of this course are to equip you with the necessary skills to work as a computer graphics expert in the industry, specifically in the development of optimal graphical interactive environments and game development. Through practical experience in computer graphics, you will also acquire the essential theoretical foundation that prepares you for a successful career in the industry.

Course Aims

- To teach you how to develop and manipulate 2D and 3D objects, including transformations and object control.
- To instruct you in scripting languages used in game engines.
- To familiarize you with the development of materials, and the incorporation of reflection and shadows.
- To acquaint you with static meshes, collision detection, and physics in 3D.
- To familiarize you with lighting techniques and shadows.
- To introduce the use of cameras for creating different perspectives, such as first-person and third-person views.
- To instruct you on collision detection and the application of physics in both 2D and 3D.
- To familiarize you with the process of converting a standard 3D environment into a virtual reality-based environment.
- To teach you how to define interactions in virtual reality and create an environment that is as realistic as possible.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Understand how game engines work.
CLO2 : Comprehend computer graphics concepts, such as graphical objects, the hierarchical model of objects, lighting, shadow, reflection, surface, texture maps, and their practical implementation.
CLO3 : Be able to design 2D, 3D and virtual reality-based graphical environments and objects including lines, curves, surfaces, geometrical shapes, etc.
CLO4 : Be able to apply physics and collisions in 2D and 3D environments
CLO5 : Be able to render scenes on a range of platforms and hardware devices

Course Learning Outcomes	Assessment Item
CLO1 : Understand how game engines work.	• Project Presentation • Project Implementation (Individual)
CLO2 : Comprehend computer graphics concepts, such as graphical objects, the hierarchical model of objects, lighting, shadow, reflection, surface, texture maps, and their practical implementation.	• Project Presentation • Project Implementation (Individual)
CLO3 : Be able to design 2D, 3D and virtual reality-based graphical environments and objects including lines, curves, surfaces, geometrical shapes, etc.	• Project Presentation • Project Implementation (Individual)
CLO4 : Be able to apply physics and collisions in 2D and 3D environments	• Project Presentation • Project Implementation (Individual)
CLO5 : Be able to render scenes on a range of platforms and hardware devices	• Project Presentation • Project Implementation (Individual)

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Echo 360

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Written Proposal and Project Prototype Assessment Format: Group	10%	Start Date: Not Applicable Due Date: Week 4: 30 September - 06 October
Project Implementation (Group) Assessment Format: Group	10%	Start Date: Not Applicable Due Date: Week 9: 04 November - 10 November
Project Presentation Assessment Format: Group	10%	Start Date: Not Applicable Due Date: Week 10: 11 November - 17 November
Project Implementation (Individual) Assessment Format: Individual	70%	Start Date: Not Applicable Due Date: Week 11: 18 November - 24 November

Assessment Details
Written Proposal and Project Prototype

Assessment Overview

In this assessment, students are expected to create a document that addresses key questions regarding the project they intend to develop. The project proposal should consist of a concise description of the project's objectives and the approach that will be employed to achieve them. Additionally, the proposal should outline how the project will fulfill all the requirements outlined in the project instructions provided to students. Students are encouraged to present their vision for implementing a 2D, 3D, or VR-based environment within their proposal.

Students will submit this assignment using the Turnitin submission box on Moodle, and their tutors will mark and provide feedback using the commenting features available on Turnitin.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other

media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see here.

Project Implementation (Group)

Assessment Overview

In this assessment, students are expected to merge their individual projects into a single comprehensive project and submit the final version. The submission should include both the rendered version of the project and the source code.

Students are instructed to submit their code on GitLab. The tutor will evaluate the submissions and provide written feedback on Moodle.

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see here.

Project Presentation

Assessment Overview

In this assessment, students are required to prepare and deliver a presentation showcasing the graphical environment they have developed, whether it be 2D, 3D, or VR-based. They should also explain and justify the various techniques they employed to design and optimize the environment.

Students will present their work during their tutorial sessions, and their tutor will evaluate their presentation and provide written feedback on Moodle.

Course Learning Outcomes

- CLO1 : Understand how game engines work.
- CLO2 : Comprehend computer graphics concepts, such as graphical objects, the hierarchical model of objects, lighting, shadow, reflection, surface, texture maps, and their practical implementation.
- CLO3 : Be able to design 2D, 3D and virtual reality-based graphical environments and objects including lines, curves, surfaces, geometrical shapes, etc.
- CLO4 : Be able to apply physics and collisions in 2D and 3D environments
- CLO5 : Be able to render scenes on a range of platforms and hardware devices

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

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Project Implementation (Individual)

Assessment Overview

In this assessment, students are required to compile, render, and submit the individual version of their project. The submission should include both the rendered version of the project as well as the source code.

Students are instructed to submit their code on GitLab. The tutor will evaluate the submissions and provide written feedback on Moodle.

Course Learning Outcomes

- CLO1 : Understand how game engines work.
- CLO2 : Comprehend computer graphics concepts, such as graphical objects, the hierarchical model of objects, lighting, shadow, reflection, surface, texture maps, and their practical implementation.

- CLO3 : Be able to design 2D, 3D and virtual reality-based graphical environments and objects including lines, curves, surfaces, geometrical shapes, etc.
- CLO4 : Be able to apply physics and collisions in 2D and 3D environments
- CLO5 : Be able to render scenes on a range of platforms and hardware devices

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see here.

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	• Introduction to computer graphics • Player pawn and transform tools in 3D • Introduction to Blueprints coding
	Laboratory	
Week 2 : 16 September - 22 September	Lecture	• Mapping controllers to move objects in 3D • Introduction to material concept • Introduction to geometry brushes in 3D • Introduction to static meshes
	Laboratory	
Week 3 : 23 September - 29 September	Lecture	• Introduction to collision detection and physics in 3D • Introduction to the trigger box 3D • Introduction to rendering • Advanced concepts in geometry brushes in 3D • Introduction to lights and shadows • introduction to blueprint classes
	Laboratory	
Week 4 : 30 September - 6 October	Lecture	• Player pawn class and camera • Mapping controllers to rotate objects in 3D • Advanced concepts of camera • Advanced material design • Advanced collision detection and physics in 3D • Animating objects • Blueprint functions • Blueprint macros
	Laboratory	
Week 5 : 7 October - 13 October	Lecture	• Creating projectile in 3D • Importing prebuilt graphical elements (FBX files) • Applying damage to the player pawn • Creating conditional trigger box • Introduction to landscape brushes • Texture layers • Advanced concepts in landscape brushes • Creating Visual Effects (The Niagara VFX System)
	Laboratory	
Week 7 : 21 October - 27 October	Lecture	• Introduction to virtual reality • Rendering VR scenes • Mapping virtual reality controllers • Creating VR player pawn • Developing VR hand
	Laboratory	
Week 8 : 28 October - 3 November	Lecture	• Grabbing and moving objects in VR • Movement in VR • Snap turn in VR • Teleportation Movement in VR
	Laboratory	
Week 9 : 4 November - 10 November	Lecture	• 2D Objects and transform • Player pawn 2D • Introduction to C# programming • Mapping controllers in 2D • Prefab objects and projectiles in 2D
	Laboratory	
Week 10 : 11 November - 17 November	Lecture	• Physics and collision detection 2D • Introduction to trigger box 2D • Applying damaging and destroying objects 2D • Spawn manager • Adding user interface elements • Animating objects in 2D • Rendering 2D sprites
	Laboratory	

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
	Ali Darejeh					Yes	Yes

Other Useful Information
Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's Special Consideration page.

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning Services

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School Contact Information

CSE Help! - on the Ground Floor of K17

- For assistance with coursework assessments.

The Nucleus Student Hub - https://nucleus.unsw.edu.au/en/contact-us

- Course enrolment queries.

Grievance Officer - grievance-officer@cse.unsw.edu.au

- If the course convenor gives an inadequate response to a query or when the courses convenor does not respond to a query about assessment.

Student Reps - stureps@cse.unsw.edu.au

- If some aspect of a course needs urgent improvement. (e.g. Nobody responding to forum queries, cannot understand the lecturer)

You should **never** contact any of the following people directly:

- Vice Chancellor

- Pro-vice Chancellor Education (PVCE)

- Head of School

- CSE administrative staff

- CSE teaching support staff

They will simply bounce the email to one of the above, thereby creating an unnecessary level of indirection and a delay in the response.