

COMP3320: Computer Graphics

Callaghan

Semester 2 - 2018



OVERVIEW

Course Description

Studies issues related to the displaying of objects, which may include: 2D drawing primitives, homogeneous coordinates, curves and surfaces, 2D & 3D geometrical transformation, projections, geometric models, 3D viewing, visible-surface determination, illumination and shading, ray tracing, real time rendering, colour modes, computer vision.

Assumed Knowledge

SENG1120

MATH1110

Contact Hours

**Callaghan
Computer Lab**

Face to Face On Campus

2 hour(s) per Week for Full Term

It is recommended that students attend lectures and labs regularly.

Lecture

Face to Face On Campus

2 hour(s) per Week for Full Term

Unit Weighting

10

Workload

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

CONTACTS

Course Coordinator **Callaghan**
Associate Professor Stephan Chalup
Stephan.Chalup@newcastle.edu.au
(02) 492 16080
Consultation: For consultation times please see blackboard or make an appointment by email.

Teaching Staff Other teaching staff will be advised on the course Blackboard site.

School Office **School of Electrical Engineering and Computing**
ICT307
ICT Building
Callaghan
+61 2 4921 5330
9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

SYLLABUS

Course Content

1. Graphics pipeline.
2. Graphics algorithms.
3. Geometrical operations used in graphics.
4. Methods for modeling curves, surfaces, and solids.
5. Lighting models and colour.
6. Computer vision.

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Appreciate mathematical fundamentals of computer graphics techniques.
2. Understand and appreciate computer graphics concepts
3. Employ selected software to achieve interactive computer graphics
4. Be able to implement graphics effects
5. Work within a group to complete a graphics project

Course Materials

Recommended Reading:

- Tomas Akenine-Möller, Eric Haines, Naty Hoffman. **Real-Time Rendering**, Third Edition. A K Peters/CRC Press, 2008.
- Dave Shreiner, Graham Sellers, John M. Kessenich, and Bill Licea-Kane. **OpenGL Programming Guide: The Official Guide to Learning OpenGL**, Version 4.3 (8th Edition), Addison-Wesley Professional; March 30, 2013. (or newer edition)
- For additional material see blackboard.

Required Reading:

- Lecture slides will be made available on blackboard.
- Exercise sheets will be made available on blackboard.

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

-

Course Assessment Requirements:

- Formal Examination: Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course. - *Students whose overall mark in the course is 50% or more, but who score less than 40% in the compulsory item and thus fail to demonstrate the required proficiency, will be awarded a Criterion Fail grade, which will show as FF on their formal transcript. However, students in this position who have scored at least 25% in the compulsory item will be allowed to undertake a supplementary 'capped' assessment in which they can score at most 50% of the possible mark for that item.*

Pre-Placement Requirements:

-

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Midsemester exam	For details see blackboard.	Individual	10%	1, 2
2	Project	See blackboard for due dates of each component.	Group	50%	1, 2, 3, 4, 5
3	Formal Examination*	See exam timetable.	Individual	40%	1, 2

* This assessment has a compulsory requirement.

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Midsemester exam

Assessment Type	In Term Test
Purpose	We test the concepts learned in the lectures. This exam will serve as preparation for the final exam.
Description	Individual written exam
Weighting	10%
Length	90 minutes
Due Date	For details see blackboard.
Submission Method	In Class
Assessment Criteria	All answers must be answered correctly in order to achieve full marks. Details about achievable marks per question are provided on the exam paper.
Return Method	Not Returned
Feedback Provided	In Class - See course overview on blackboard. Comments on possible answers to the exam questions

Assessment 2 - Project

Assessment Type	Project
Purpose	The aim of this graphics programming project is to implement a computer graphics task of your choice (e.g. a game, an animation, a research visualization, computer art or an interactive simulation) that follows a given theme and satisfies several additional requirements. The theme and the requirements will be specified on blackboard when the project is released.
Description	<p>In the computer graphics industry it is common to work in teams. Therefore this project is also an exercise in teamwork and time management and requires that you work in small teams of 3-6 students (exceptions are possible but must be discussed with the lecturer). Please try to form your team as soon as possible in the first two weeks of the course.</p> <p>The project will have the following components.</p> <ol style="list-style-type: none">1. Project Proposal (weighting 5%)2. Background Presentation (weighting 10%)3. Intermediate Progress Report I (weighting 5%)4. Intermediate Progress Report II (weighting 5%)5. Final presentation and Report (weighting 25%) <p>Deadlines and criteria for each component will be made available on blackboard.</p>
Weighting	50%
Length	See blackboard.
Due Date	See blackboard for due dates of each component.
Submission Method	In Class Ongoing Assessment Online
Assessment Criteria	Each project component has individual criteria that will be available on blackboard.
Return Method	Not Returned
Feedback Provided	In Class - For some components feedback will be given. For details see blackboard.

Assessment 3 - Formal Examination

Assessment Type	Formal Examination
Purpose	The final formal examination is designed to test the individual student's knowledge of the course material and their ability to describe, analyse and hypothesise from this material.
Description	
Weighting	40%
Compulsory Requirements	Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course (see above).
Length	3 hours
Due Date	See exam timetable.
Submission Method	Formal Exam
Assessment Criteria	Marked by CC.
Return Method	Not Returned
Feedback Provided	No Feedback - .

2018 - Retention of Assignment Scripts

In 2018, the University of Newcastle will undergo its 5 yearly accreditation cycle with Engineers Australia and the Australian Computer Society. Part of this routine process is the collection of a sample of student assignments over a 1+ year period. The objective is to provide the accrediting panel an indication of educational rigour across all courses. In 2017, we will commence collecting sample assignments from each and every assessment task, across the full spectrum of marks. They will be provided to the panel but not de-identified. If you object to your assignment being retained with your name associated, please indicate this on the submission, and if retained, we will de-identify your paper. All papers will be destroyed at the completion of the accreditation process.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- Blackboard Course Site: Students will receive communications via the posting of content or announcements on the Blackboard course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity policy, refer to <http://www.newcastle.edu.au/policy/000608.html>.

Adverse Circumstances

You are entitled to apply for special consideration because adverse circumstances have had an impact on your performance in an assessment item. This includes applying for an extension of time to complete an assessment item. Prior to applying you must refer to the Adverse Circumstances Affecting Assessment Items Procedure, available at <http://www.newcastle.edu.au/policy/000940.html>. All applications for Adverse Circumstances must be lodged via the online Adverse Circumstances system, along with supporting documentation.

Important Policy Information

The 'HELP for Students' tab in UoNline contains important information that all students should be familiar with, including various systems, policies and procedures.

	University of Newcastle Computer Science Graduate Profile Statements	Taught	Practised	Assessed	Level of Capability
1	Knowledge of basic science and computer science fundamentals.	☑	☑	☑	4
2	In depth technical competence in the discipline of computer science	☑	☑	☑	4
3	An ability to carry out problem analysis, requirements capture, problem formulation and integrated software development for the solution of a problem.	☑	☑	☑	3
4	Capacity to continue developing relevant knowledge, skills and expertise in computer science throughout their careers.	☑			3
5	An ability to communicate effectively with other Computer Scientists, Software Engineers, other professional disciplines, managers and the community generally.		☑	☑	2
6	Ability to undertake and co-ordinate large computer science projects and to identify problems, their formulation and solution.		☑	☑	3
7	Ability to function effectively as an individual, a team member in multidisciplinary and multicultural teams and as leader/manager with capacity to assist and encourage those under their direction.		☑		2
8	Understanding of social, cultural, global and business opportunities of the professional computer scientist; understanding the need for and principles of sustainability and adaptability				
9	Understanding of professional and ethical responsibilities and a commitment to them.	☑			2
10	Understanding of entrepreneurship; need of and process of innovation, as well as the need of and capacity for lifelong learning.	☑			2

	University of Newcastle Bachelor of Engineering Graduate Profile Statements	Taught	Practised	Assessed	Level of capability
	Knowledge Base				
1	1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		2
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	4
5	1.5. Knowledge of contextual factors impacting the engineering discipline.	<input checked="" type="checkbox"/>			2
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.	<input checked="" type="checkbox"/>			2
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
8	2.2. Fluent application of engineering techniques, tools and resources.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
9	2.3. Application of systematic engineering synthesis and design processes.		<input checked="" type="checkbox"/>		2
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.		<input checked="" type="checkbox"/>		4
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		3
12	3.2. Effective oral and written communication in professional and lay domains.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
13	3.3. Creative, innovative and pro-active demeanour.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
14	3.4. Professional use and management of information.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
15	3.5. Orderly management of self, and professional conduct.	<input checked="" type="checkbox"/>			3
16	3.6. Effective team membership and team leadership.		<input checked="" type="checkbox"/>		3

	University of Newcastle Information Technology Graduate Profile Statements	Taught	Practised	Assessed	Level of Capability
1	Demonstrate a comprehensive understanding of the discipline of information technologies with an emphasis on net-centric applications, information management, and user requirements for ethical professional practice.				
2	Apply critical reasoning and systems thinking to understand and support the operation and constraints of contemporary enterprises and their dynamic environment.				
3	Work independently and collaboratively to locate, manage and organise information and resources and apply evidence-based methodologies to create, modify and maintain designs and design solutions.	☑	☑	☑	3
4	Use creativity, problem solving skills, project management skills and technical expertise to analyse, interpret, evaluate and generate solutions to complex technical and organisational problems.	☑	☑	☑	4
5	Demonstrate professional judgement and responsibility by communicating information technology principles, practices, standards to specialist and non-specialist audience clearly and persuasively.		☑	☑	2

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

© 2018 The University of Newcastle, Australia