### **School of Information and Physical Sciences**

### **COMP6370: Computer Graphics**

Callaghan Semester 2 - 2023



### **OVERVIEW** Studies issues related to the displaying of objects, which may **Course Description** include: graphics hardware, windows programming, 2D drawing primitives, 2D & 3D geometrical transformation, projections, geometric models, 3D viewing, visible-surface determination, illumination and shading, ray tracing, and computer animation. Requisites This course has similarities to COMP3320. If you have successfully completed COMP3320 you cannot enrol in this course. Assumed Knowledge 1. Familiarity with a. elementary linear algebra (vectors, matrices) and geometry. b. elementary calculus (for some parts of the course). 2. Some Computer Science a. reasonable programming skills b. elementary data structures and algorithms 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.



www.newcastle.edu.au CRICOS Provider 00109J



# CONTACTS

**Course Coordinator** 

Callaghan Prof Stephan Chalup Stephan.Chalup@newcastle.edu.au (02) 492 16080 Consultation: see Canvas

**Teaching Staff** 

**School Office** 

### School of Information and Physical Sciences SR233, Social Sciences Building Callaghan CESE-SIPS-Admin@newcastle.edu.au +61 2 4921 5513

9am-5pm (Mon-Fri)

Other teaching staff will be advised on the course Canvas site.

## **SYLLABUS**

| Course Content              | <ol> <li>Graphics pipeline</li> <li>Graphics algorithms</li> <li>Geometrical operations used in graphics</li> <li>Methods for modeling curves, surfaces, and solids</li> <li>Lighting models and colour</li> <li>Computer vision</li> </ol> |  |  |  |  |
|-----------------------------|---|--|--|--|--|
| Course Learning<br>Outcomes | On successful completion of this course, students will be able to:<br>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. Implement graphics effects   |  |  |  |  |
|                             | 5. Work within a group to complete a graphics project   |  |  |  |  |
| Course Materials            | <ul> <li>Recommended Reading:</li> <li>Tomas Akenine-Möller, Eric Haines, Naty Hoffman. Real-Time Rendering, Fourth Edition. A K<br/>Peters/CRC Press, 2018</li> </ul>  |  |  |  |  |

### **Required Reading:**

- Lecture slides will be made available in Canvas. Exercise sheets will be made available in Canvas.



# **COMPULSORY REQUIREMENTS**

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

#### **Contact Hour Requirements:**

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#### **Course Assessment Requirements:**

- Assessment 3 - 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<br>Outcomes |
|---|---|--|-------------|-----------|----------------------|
| 1 | Project (multi<br>component)            | <ul> <li>Project proposal and presentation:<br/>Wednesday 2.8.2023, 1pm (8%)</li> <li>Intermediate Progress<br/>Presentation and Report: Friday<br/>1.9.2023, 10am-12pm (7%)</li> <li>Intermediate formative project<br/>evaluations in the lab, Friday<br/>15.9.2023, 10am-12pm</li> <li>Background presentation: due<br/>date depends on topic and team<br/>and will be scheduled throughout<br/>the course (7%)</li> <li>Final project presentation:<br/>18.10.2023, 1-3pm (18%)</li> </ul> | Group       | 40%       | 1, 2, 3, 4, 5        |
| 2 | Written Assessment<br>(multi component) | <ul> <li>Individual project journal and final<br/>paper: will be checked throughout<br/>the semester and finally submitted<br/>by 16.10.2023, 6pm (20%)</li> </ul>   | Individual  | 20%       | 1, 2                 |
| 3 | Formal Examination*                     | Formal Examination Period  | 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 - Project (multi component)

| 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 in Canvas when the project is released.   |  |  |  |  |
| Description   | In the computer graphics industry it is common to work in teams. Therefore this project is also<br>an exercise in teamwork and time management and requires that you work in small teams of<br>1-4 students (exceptions are possible but must be discussed with the lecturer). Please try to<br>form your team as soon as possible in the first two weeks of the course  |  |  |  |  |
| Weighting   | 40%  |  |  |  |  |
| Length  | see Canvas   |  |  |  |  |
| Due Date  | <ul> <li>Project proposal and presentation: Wednesday 2.8.2023, 1pm (8%)</li> <li>Intermediate Progress Presentation and Report: Friday 1.9.2023, 10am-12pm (7%)</li> <li>Background presentation: due date depends on topic and team and will be scheduled throughout the course (7%)</li> <li>Intermediate formative project evaluations in the lab, Friday 15.9.2023, 10am-12pm</li> <li>Final project presentation: 18.10.2023, 1-3pm (18%)</li> </ul> |  |  |  |  |
| Submission Method   | In class/lecture/lab for all presentations (for details see canvas); online for the proposal and the first progress report.  |  |  |  |  |
| Assessment Criteria<br>Return Method<br>Feedback Provided | See Canvas for details<br>Not Returned<br>No Feedback  |  |  |  |  |
|   |  |  |  |  |  |

### Assessment 2 - Written Assessment (multi component)

| Assessment Type  | Written Assignment   |
|--|--|
| Purpose  | <ul> <li>This assessment item is individual and has two components that are linked: A journal and a final report:</li> <li>1. The individual journal should outline all work that you have completed or contributed to during the project, including dates of work and how long (approximately) you spent on each task. The purpose is to keep you on track and reflect on your contributions as member of your project team.</li> <li>2. Final report associated with your project: Your final report should summarise and build on your project while offering a higher-level view and critical discussion of the topic. It is expected to include a literature review, some extended investigation, and research aspects.</li> </ul>  |
| Description  | <ul> <li>The final report should have around 10-12 pages and be written in the style of a conference paper (for example Springer LNCS formatting). The journal and final paper are an individual assignment (that is, you may not share or work on this with other students, either from your group, or otherwise). The journal is a formative component that should support the writing of the final report. The journal may be checked by the tutor throughout the semester.</li> <li>The marking components for the final report include: <ul> <li>a) Innovative and research aspects of the project or discussion.</li> <li>b) Quality of literature review.</li> <li>c) Clarity and structure of the presented material</li> <li>d) Quality of work presented</li> <li>e) Level of difficulty and significance of the contribution</li> <li>f) Demonstrated understanding of the project</li> </ul> </li> </ul> |
| Weighting<br>Length<br>Due Date<br>Submission Method<br>Assessment Criteria<br>Return Method | <ul> <li>20%</li> <li>See Canvas for details</li> <li>Individual project journal: will be checked throughout the semester (formative).</li> <li>Final individual report: 16.10.2023, 6pm (20%)</li> <li>Online</li> <li>See Canvas for details</li> <li>Not Returned</li> </ul>  |



Feedback Provided No Feedback

### **Assessment 3 - Formal Examination**

| Assessment Type<br>Purpose | Formal Examination<br>The final formal examination is designed to test the individual student's knowledge of the<br>course material and their ability to describe, analyse and hypothesise from this material. |
|----------------------------|--|
| Description                | See Canvas   |
| Weighting                  | 40%  |
| Compulsory                 | Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade /  |
| Requirements               | mark in this assessment item to pass the course.   |
| Length                     | See Canvas   |
| Due Date                   | See exams timetable  |
| Submission Method          | Formal Exam  |
| Assessment Criteria        | See Canvas   |
| Return Method              | Not Returned   |
| Feedback Provided          | No Feedback  |
| Opportunity to             | Students WILL be given the opportunity to reattempt this assessment.   |
| Reattempt                  | Refer to course outline for details.   |

# **ADDITIONAL INFORMATION**

#### **Grading Scheme**

This course is graded as follows:

| Range of<br>Marks | Grade                       | Description  |
|-------------------|-----------------------------|--|
| 85-100            | High<br>Distinction<br>(HD) | Outstanding standard indicating comprehensive knowledge<br>and understanding of the relevant materials; demonstration of<br>an outstanding level of academic achievement; mastery of<br>skills*; and achievement of all assessment objectives.             |
| 75-84             | Distinction<br>(D)          | Excellent standard indicating a very high level of knowledge<br>and understanding of the relevant materials; demonstration of<br>a very high level of academic ability; sound development of<br>skills*; and achievement of all assessment objectives.     |
| 65-74             | Credit<br>(C)               | Good standard indicating a high level of knowledge and<br>understanding of the relevant materials; demonstration of a<br>high level of academic achievement; reasonable development<br>of skills*; and achievement of all learning outcomes.               |
| 50-64             | Pass<br>(P)                 | Satisfactory standard indicating an adequate knowledge and<br>understanding of the relevant materials; demonstration of an<br>adequate level of academic achievement; satisfactory<br>development of skills*; and achievement of all learning<br>outcomes. |
| 0-49              | Fail<br>(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: - Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas 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** 

### **Oral Interviews (Vivas)**

**as)** As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be



|                                 | conducted in accordance with the principles set out in the <u>Oral Examination (viva) Procedure</u> .<br>In cases where the oral examination reveals the assessment item may not be the student's<br>own work the case will be dealt with under the <u>Student Conduct Rule</u> .   |  |  |  |  |  |
|---------------------------------|---|--|--|--|--|--|
| 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 https://policies.newcastle.edu.au/document/view-current.php?id=35.  |  |  |  |  |  |
| Adverse<br>Circumstances        | <ul> <li>The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:</li> <li>the assessment item is a major assessment item; or</li> <li>the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances</li> </ul> |  |  |  |  |  |
|                                 | <ul> <li>3. you are requesting a change of placement; or</li> <li>4. the course has a compulsory attendance requirement.</li> <li>Before applying you must refer to the Adverse Circumstance Affecting Assessment Items</li> <li>Procedure available at:<br/>https://policies.newcastle.edu.au/document/view-current.php?id=236</li> </ul>  |  |  |  |  |  |
| Important Policy<br>Information | The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures that support a safe and respectful environment at the University.   |  |  |  |  |  |

#### **GRADUATE PROFILE STATEMENTS**

The following table illustrates how this course contributes towards building the skills students will need to work in their profession.

#### Level of capability

- Level 1 indicates an introduction to a topic at a university level
- Levels 2 and 3 indicate progressive reinforcement of that topic
- Level 4 indicates skills commensurate with a graduate entry to professional practice
- Level 5 indicates highly specialist or professional ability

|   | University of Newcastle Masters of Information<br>Technology Graduate Profile Statements   | Taught | Practised | Assessed | Level of<br>Capability |
|---|--|--------|-----------|----------|------------------------|
| 1 | The ability to identify and analyse complex<br>problems within information technology and design<br>solutions to these problems at a highly skilled level  | Х      | Х         | Х        | 5                      |
| 2 | A depth of technical expertise in at least one facet of<br>information technology sufficient for a career in<br>information technology together with the capacity to<br>continue developing relevant knowledge, skills and<br>expertise throughout their careers | Х      | х         | X        | 5                      |
| 3 | The ability to manage projects in aspects of<br>information technology relevant to their field of<br>study, including the ability to develop, manage and<br>participate at all levels in team environments   |        | Х         |          | 4                      |
| 4 | An understanding of professionalism and ethics in the context of the global information technology industry.   | Х      | Х         |          | 5                      |



| 5 | The ability to communicate effectively through a<br>range of verbal, written and/or presentation skills at<br>an advanced level  |   | Х |   | 5 |
|---|--|---|---|---|---|
| 6 | The ability to apply their knowledge and skills to<br>plan and execute a substantial capstone<br>experience or a research-based project and/or<br>piece of scholarship | Х | Х | Х | 5 |

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.

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