

Three-Dimensional Modelling for Computer Graphics - Course Outline

COMP 409: 2013 Trimester 2

This document sets out the workload and assessment requirements for COMP 409. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement in lectures and/or on the course web site. A printed copy of this document is held in the School Office.

Objectives

By the end of the course, students should be able to:

1. *understand the characteristics and trade-offs of various geometric representations.*
2. *program simple modelling operations using a common graphics framework such as Maya.*
3. *understand several general approaches to geometry processing including some familiarity with underlying mathematical concepts.*

The course requires that students have previous experience in graphics programming.

This course introduces the algorithmic and mathematical foundations of three-dimensional modelling. It is not a course on content creation. Topics include representations such as polygons, splines, implicit surfaces, point models, particle systems, and volumetric models, concepts such as parameterisation, curvature, and discrete differential geometry, and algorithmic approaches such as gradient domain processing, spectral processing, and example-based deformation.

The course approach is based on the belief that Computer Graphics is best learned by doing. In Assignments 1-3 students will create simple programs that implement key concepts. In the Final Project, students will select and implement a simple research paper from the previous computer graphics literature using a graphics framework.

Students will also do short presentations. In the first half of the course these will be 5 minute (approximate length) presentations covering refresher mathematical concepts needed to understand the projects. In the second half of the course students will select and present relevant research papers. These presentations will be 10-15 minutes. The selected papers will be approved by the coordinator.

Textbook

There is no set textbook for COMP 409, however we will refer to the book *Polygon Mesh Processing* by Botsch et al. This book is on reserve at the VUW library.

ACM SIGGRAPH has relevant courses, such as these:

- [Discrete Differential Geometry: An Applied Introduction](#)
- [Mesh editing based on discrete Laplace and Poisson Models](#)
- [Spectral mesh processing](#)
- [Scattered data interpolation and approximation for computer graphics](#)

Lectures, Tutorials, Laboratories, and Practical work

COMP 409 is a trimester 2 course. The trimester starts on 15 July. The examination period at the end of the course is 25 October-16 November.

A [schedule](#) of lecture topics, readings, and assignment due dates is available online.

Lectures for COMP 409 are: *Mon, Wed, Fri from 12-12:50 in Murphy 303*

Assignments, Project, and Presentations

Computer graphics is best learned by doing and showing the results. There will be three assignments and one final project that require computer graphics programming. Work for marking should be submitted electronically using the [ECS Submission System](#). The details of the assignments and projects will be provided in the lectures. The assignments and projects will be due at 11:59pm on the indicated date.

- Assignment 1: 14 August
- Assignment 2: 11 September
- Assignment 3: 25 September
- Final Project: 18 October

It is expected that you will do about five presentations during the trimester (this number may need to be adjusted slightly depending on the number of students in the course).

For the concept presentations, the students should find an *intuitive* or visual explanation of the concept, including if possible some *motivation or applications*, especially in graphics. The source material can be from courses, blogs, papers, or books. The presentation should include excerpts from these sources, and may (*but need not*) include new text or illustrations. As a guideline, three to five slides may be sufficient.

For the research paper presentations, the students should explain the problem that is being addressed, and briefly indicate how the chosen approach addresses that problem and improves over previous approaches. The research paper presentations should be 10-15 minutes in length.

Workload

In order to maintain satisfactory progress in COMP 409, you should plan to spend an average of at least 10 hours per week on this paper. A plausible and approximate breakdown for these hours would be:

- Reading and Presentations: 3 hours
- Lectures: 3 hours
- Assignments and Project: 4 hours

School of Engineering and Computer Science

The School office is located on level three of the Cotton Building ([Cotton 358](#)).

The notice board for COMP 409 is located on the second floor of the Cotton Building.

Staff

The course organiser for COMP 409 is [John Lewis](#). His contact details are:

- [John Lewis](#)
- [Cotton 236](#)
- +64 4 463 5233 x 7527
- john.lewis@ecs.vuw.ac.nz

Announcements and Communication

The main means of communication outside of lectures will be the COMP 409 web area at http://ecs.victoria.ac.nz/Courses/COMP409_2013T2/. There you will find, among other things, this document, the [lecture schedule](#) and [assignment handouts](#), and the [COMP 409 Forum](#). The forum is a web-based bulletin board system. Questions and comments can be posted to the forum, and staff will read these posts and frequently respond to them.

Assessment

Your grade for COMP 409 will be determined based on the following assessment weightings:

<u>Item</u>	<u>Weight</u>
Assignment 1	10%
Assignment 2	10%
Assignment 3	10%
Final Project	30%
Final Examination	30%
Presentations	10%

Examination

The [timetable for final examinations](#) will be available from the University web site and will be posted on a notice board outside the faculty office. The final examination will be three hours long. No computers, electronic calculators or similar device will be allowed in the final examination. Paper non-English to English dictionaries will be permitted. The examination period for trimester 2 is 25 October - 16 November.

Practical Work

The three assignments involve a small amount of programming as needed to produce a computational illustration of a particular concept. These programs may be as small as 30-100 lines. and can be implemented if desired in a prototyping

language such as Python/Numpy or Matlab.

The Final Project is a larger and more open-ended programming project. It should be implemented in a modern graphics framework such as Maya, OpenFrameworks, or a game engine. The final project will also require a report describing your work. The final project will be a group project, however you will be assessed individually. Your contribution should be made clear both in the code that you hand in, and in your report.

All the materials for the projects should be submitted electronically using the [ECS Submission System](#). Other methods (e.g. email) are not accepted. Marked projects will be available at lectures, or from the School Office ([Cotton 358](#)). All projects must be submitted on time.

Students will hand in the presentation in Powerpoint or .pdf format on the day of the presentation.

The policy on late submission is as follows:

- The Presentations must be delivered on time to receive credit. The Assignments and Final Project should be submitted on time, however, you can apply "Late days" as described below.
- Each assignment or project that is late (ie, submitted on the submission system after the deadline) will be penalised by 20 marks if it is up to 24 hours late, and penalised by 40 marks if it is between 24 hours and 48 hours late. Any work submitted more than 48 hours after the deadline **will receive 0 marks**.
- Each student will have 3 "late days" which you may choose to use for the Assignments or Final Project. There will be no penalty applied for these late days. You do not need to apply for these - any late days you have left will be automatically applied to projects that you submit late.
- The late days are intended to cover minor illnesses or other personal reasons for being late. You should only ask for extensions in the case of more significant or longer lasting problems (and you may need documentation). Do not waste "late days" on procrastination!

All submitted code must be compiled and run on the ECS Linux system or on a Mac. You can work on any other platforms, but programs that do not compile and run on the ECS Linux system or Mac will not be marked. Since computer graphics is all about showing results on the screen, projects are marked based primarily on the final output on the display.

Plagiarism

Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students, to help and seek help with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The [School policy on Plagiarism](#) (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

Mandatory Requirements

Both the practical work and an understanding of the concepts and principles of modelling are essential to the course. Therefore, there is a mandatory requirement that you obtain at least 40% on the total of the three assignments, at least 40% on the Final Project, and at least 40% on the exam.

Passing COMP 409

To pass COMP 409, a student must satisfy mandatory requirements and gain at least a **C** grade overall.

Withdrawal

The last date for withdrawal from COMP 409 with entitlement to a refund of tuition fees is Friday 26 July 2013. The last date for withdrawal without being regarded as having failed the course is Friday 27 September 2013 -- though later withdrawals may be approved by the Dean in special circumstances.

Rules & Policies

Find key dates, explanations of grades and other useful information at <http://www.victoria.ac.nz/home/study>.

Find out about academic progress and restricted enrolment at <http://www.victoria.ac.nz/home/study/academic-progress>.

The University's statutes and policies are available at <http://www.victoria.ac.nz/home/about/policy>, except qualification statutes, which are available via the Calendar webpage at <http://www.victoria.ac.nz/home/study/calendar> (See Section

C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at <http://www.victoria.ac.nz/home/about/avcacademic>

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

[Grievances](#)

[Student and Staff Conduct](#)

[Meeting the Needs of Students with Disabilities](#)

[Student Support](#)

[Academic Integrity and Plagiarism](#)

[Dates and Deadlines including Withdrawal dates](#)

[School Laboratory Hours and Rules](#)

[Printing Allocations](#)

[Expectations of Students in ECS courses](#)

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.

[Course Outline as PDF](#)
