TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

Three-Dimensional Modelling for Computer Graphics - Course Outline

CGRA 409: 2016 Trimester 2

This document sets out the workload and assessment requirements for CGRA 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. (BE 3(a); BSc COMP 4);
2. program simple modelling operations using a common graphics framework such as Maya. (BE 3(a), 3(b), 3(f); BSc COMP 1, 2, 3, 4).
3. understand several general approaches to geometry processing including some familiarity with underlying mathematical concepts. (BE 3(a); BSc COMP 4);

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

Generally, the course introduces topics in geometric processing, such as: smoothing, parametrization, remeshing, simplification, deformation, and surface reconstruction.

Geometry processing requires advanced programming skills that involve graphics manipulation and real-time calculations. The recommendation is:

- Maya+python for GUI
- Matlab (has a script-based language) for linear algebra and math calculations.
- C++ for real-time performance.

Geometry processing requires advanced math:

- Calculus of multivariate functions
- Linear algebra
- Differential geometry

This semester would be project-based. There would be no frontal lectures, and students would have appointed meetings with the lecturer instead.

This semester we would focus on mappings with applications such shape deformation, shape parametrization, and shape interpolation. We start with a brief math overview to cover our bases. Afterwards, we test our basic skills with implementing a simple paper. Then, we start working on a project.

Textbook

- There is no set textbook for CGRA 409.
- The book *Polygon Mesh Processing* by Botsch et al. is helpful for mathematical topics (may be on reserve at the VUW library).
- The book *Maya Python for Games and Film* by Mechtley and Trowbridge is helpful for Maya API programming (might be available in the library in ebook form).

ACM SIGGRAPH has a number of 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

Workload

In order to maintain satisfactory progress in CGRA 409, you should plan to spend an average of at least 10 hours per week on this paper.

Staff

The course organiser for CGRA 409 is Zohar Levi. His contact details are:

- *Zohar Levi*
- Cotton 338
- zohar.levi@ecs.vuw.ac.nz

Announcements and Communication

As usual.

Assessment

Based on assignments (30%) and course project (70%).

Policies

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 (i.e., submitted after the deadline) will be penalized by 20 marks if it is up to 24 hours late, and penalized 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 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 penalize anyone we find plagiarizing, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalized. 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 (e.g., 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, all the course tasks are mandatory.

Passing CGRA 409

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

Withdrawal

The last date for withdrawal from CGRA 409 with entitlement to a refund of tuition fees is Friday 22 July 2016. The last date for withdrawal without being regarded as having failed the course is Friday 23 September 2016 -- 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