Syllabus

Description

This course provides a broad introduction to computer graphics and imaging.

Topics: Image input and output devices such as cameras and displays, graphics hardware and software, input technologies and interactive techniques, light and color representations, image composition and imaging models, digital signal processing, sampling, aliasing and anti-aliasing, two- and three-dimensional geometry and transformations, modeling techniques including curves and surfaces, reflection models and illumination algorithms, and basic methods for animation.

Prerequisites

CS107, MATH 41-42.

Students must be fluent in C/C++ and familiar with modern development tools (e.g. Visual Studio, XCode, make/gdb). Programs will use the OpenGL library. Should have some familiarity with common graphics tools such as drawing programs and image processing toolkits (e.g. Photoshop or gimp).

We assume you know the following mathematics: vectors and vector operations, vector spaces, matrices, basic linear algebra such as solving a system of linear equations, polynomials, and some elementary signal processing (the Fourier transform and filtering).

This is the first course in the computer graphics sequence at Stanford. The second course is CS248 and requires CS148 as a prerequisite.

Text and readings

There is two required texts for the course.

Peter Shirley, Steve Marschner

Dave Shreiner
OpenGL Programming Guide 7th Edition (3.0 and 3.1)
Addison-Wesley, 2010

You can access the 2nd edition of this textbook online at books 24x7.

This book, often called "The Red Book," describes OpenGL, but in the process touches on many of the topics we will study in this course. This book is available online through Safari; The older 2nd Edition of the OpenGL Programming Guide is freely available. This
This book is available online through Safari; the older 2nd Edition of the OpenGL Programming Guide is freely available. This is a very good book and worth owning, but if you are in a pinch, you need not buy this book because most of the information can be found online.

Additional readings will be assigned from journals and conference proceedings, and excerpts from conference tutorials. Only papers NOT available online will be handed out in class. Readings for each lecture are available from the Lectures page.

Assignments, exams and grading

This course will include 6 programming assignments, one per week, in addition to a mid-term and a final. The mid-term and final will be written exams.

The assignments will be short and are meant to be completed in approximately 10 hours. Example code and data will be provided so that you can concentrate on the main conceptual ideas and not need to write a lot of code.

Evaluation criteria: Programming assignments will count for 70% of your grade. The mid-term and the final will each count for 15% of your grade.

Collaboration: For the programming assignments, you may discuss the assignment with friends, but you are expected to implement your own solutions.

Late assignments: Assignments will be handed out on Thu and are due the following Thu at 1:00pm. You will be given three late days.

Hardware and software

You are encouraged to do class assignments on your personal computer. Your computer should contain a modern graphics card that runs OpenGL; the graphics card should implement OpenGL shaders. OpenGL is readily available on Linux, Windows and Mac platforms. The support code has been tested on all of these platforms.

If you do not wish to develop on a personal machine, you will have access to the 'myth' machines located in Gates B08. These 3.2 Ghz DELL Dual-Xeon Linux boxes, named myth1 - myth16, are available for remote access. All students with leland accounts automatically have accounts on these machines. Home directories on these machines are shared with other Stanford Computing Clusters using AFS. If you do not have a leland account, consult this ITSS web page. Registered students will get an extra 200MB of disk quota for the quarter. Please notify the course staff immediately if you do not notice this quota increase within 48 hours of officially signing up for the course.