

CS 351 : Introduction to Computer Graphics

Overview -- Fall (Sep-Dec) 2004

ver. 1.1

Course Description

CS 351 is the first, introductory course in a 3-course series on computer graphics. It is a pre-requisite for Intermediate Graphics (CS395/495, soon to be CS352) and Advanced Graphics (CS395/495, soon to be CS353), and all CS395/495 Graphics Seminars such as Graphics for Game Design, Non-Photorealistic Rendering, Graphics and Perception, and Image-Based Modeling and Rendering.

This course teaches fundamental principles and practices that underlying all forms of computer-assisted picture-making. In every assignment, you will write programs to make pictures in different ways. You will learn and apply 2-D and 3-D viewing transformations, polygonal shape descriptions, scene graphs, bumps, texture, color, and lighting and shading using OpenGL. CS351 also introduces you to wide variety of topics in perception, shape modeling, movement, physical light transport, and depiction covered in greater depth in the later graphics courses. When you finish, you'll understand the 'rendering pipeline' hardware found in most computers, you will know how to write programs that use it, and will also know how to escape its limitations to more accurately model light transport with ray tracing.

General Info

Class Meetings: 12:30 – 1:50PM Tues/Thurs,

Room 381, CS Dept., 1890 Maple Ave (SW corner of Maple and Emerson St.)

Instructor: Jack Tumblin,

Office: Room 350, CS Dept., 1890 Maple Ave.

Email, Phone: jet@cs.northwestern.edu (847) 467-2129

Office hours: by appointment – email me!

Teaching Assistants:

Abhinav (“Abhi”) Dayal,

Office: Room 226, 1890 Maple (behind card-access door)

Email, Phone: abhinav@cs.northwestern.edu (847) 467 0272

Office hours: Wednesdays 2:00-4:00pm

Pin Ren, *Office:* Room 230, 1890 Maple (behind card-access door)

Email, Phone: p-ren@cs.northwestern.edu, (847) 491 3296

Office hours: Mondays 2:00-4:00pm

Midterm Exam: Thurs Oct 28, 12:30-1:50PM, same classroom

Final Exam: Thurs Dec 9, 7:00-9:00PM (yes, 7pm at night!), same classroom.

Prerequisites: CS 311: Data Structures

Textbooks

Required:

--A. Watt, *3D Computer Graphics*, 3rd edition, Addison-Wesley.

<http://www.aw-bc.com/catalog/academic/product/0,1144,0201398559,00.html>

Recommended: (contents of these books available on-line---see CS351 web page)

--D. Schreiner, *OpenGL Reference Manual*, 3rd edition, Addison Wesley.

--OpenGL ARB, *OpenGL Programming Guide*, 3rd edition, Addison Wesley.

(Textbooks cont'd)

The first book is the course text, and is a good overview of computer graphics in general. The second and third are narrower: they explain how to make pictures using the OpenGL programming library that you will use for your graphics assignments.

Lectures vs. Books

The exams test your understanding of materials presented in lectures and discussed in class. Course lecture notes are posted on the class website. Also, look for review sheets for the midterm and final on the site. You might think you could skip reading the textbook, and maybe you can. The required textbook presents this same material and more, but it gives more details, a better explanation, and will help you learn. All three books are worth having, worth reading, but I won't force you to go beyond the lecture materials—though I think you'll find it rewarding to do so.

Assignments and Laboratory

The assignments in this course will be done on Windows PCs using Visual Studio (either .Net or version 6 will work). You will have at least three assignments, two building toward the final assignment, which will be the construction of a very basic computer game.

The PC instructional lab (room 125) is available to you for this course. If you do not already have a login account on these machines, you will need to apply for one with an accounts form—check with the TAs to get them. To turn in your assignments, you will make a 'Zip' file and e-mail it to the TA (more details later), and what you turn in MUST run on the PCs in the instructional lab under Visual Studio. Send the complete project, so TAs can just click on the 'project' file to build and run your code. Development on other platforms is perfectly OK, as long as you port your final version to Visual Studio (OpenGL/GLUT is quite portable).

We penalize late assignments—start early! All grades are on a 0 to 100 scale, and we subtract $f(n) = 3^n$, where n is the number of class days late. This course is often heavily oversubscribed and our TA will be overworked – so please be patient with his turnaround in grading your assignments.

Project Assignment Weight

- 1. TBA 10%**
- 2. TBA 10%**
- 3. a simple game 25%**

The primary criteria for your grades are:

- 1) Does the program run, and put the desired picture on the screen?
- 2) Is it obvious to users how to make the program do things (e.g. inputs, what keystrokes do what, etc.) Every student's work must include a 'readme.txt' file explaining in detail how to run the program, set input filenames, etc.
- 3) Is the project's writeup (if assigned) clear, complete, and comprehensible?

We want these assignments to be fun, not confusing and frustrating. Please do talk with other students with hints to solve problems or improve results. But of course, the assignment you hand in (code and write-up) must be your own work. We will penalize copying and cheating in accordance with university policy, which is very, very nasty and strict. Please take this seriously; cheating in previous years has led to students expelled from school, loss of scholarships, etc.!

If you think the grading was unfair on an assignment or exam you took, you can appeal it. First, contact the TA about it, but you must wait at least an hour after receiving your marked work (to avoid overwhelming the TA in class, and to think about why you got that mark). If your appeal to the TA does not satisfy you, you can then approach the instructor. You can't make endless retro-active appeals—two weeks after an assignment is returned to you the grade is permanent and can't be appealed further.

I will describe new Project Assignments in class, but you should rely on the written Assignment file (PDF) posted on the class website to be sure you complete all of it.

Midterm and Final

Exams are closed book. The majority of each exam will deal directly with material covered in class. A problem-solving portion of the exam will require some synthesis and application of course material to a novel problem. Since the class is so large, the exam will consist mostly –if not entirely – of multiple choice questions. Beware, I ask tough multiple choice questions.

Generally speaking, you will not require calculators for the exams, though you are welcome to bring them and many students prefer having them.

Course Evaluation

Your final course grade is computed from:

Assignments	50%
Midterm	20%
Final Exam	30%

Grading on a “curve” is almost never necessary for this course. Theoretically, this means that if everyone gets 90% or above, everyone gets at least an A-. However, this has never happened. In cases where very few people receive marks above 90%, I may slide the grade intervals down by a few percentage points.

Blackboard Course Management Website

When in doubt, check the ‘Blackboard’ website for this course.

We use the website to distribute all course assignments, and to post all sorts of very useful materials to help you learn the course and complete your assignments.

Check the ‘Discussion Group’ feature of Blackboard frequently, and be sure to post any questions or confusions you have—then everybody can help and share the answers we find.

The TAs and I will monitor it frequently to help it along.