CS130 Computer graphics
Spring 2001

1 Course Information

Instructor: Dimitrios Gunopulos, dg@cs.ucr.edu
Office Hours: TTh 3:30 - 5:30, Bourns A203
TAs: Yong Tao, Michalis Vlachos
Lecture: TTh 2:10 - 3:30 SPR 1340
Textbook: *Computer Graphics: Principles and Practice*, Foley, van Dam, Feiner, and Hughes, Addison Wesley, 1990.
Recommended text: *OpenGL Programming Guide*, Mason Woo et al, Addison-Wesley, 1997.
OpenGL documentation: `http://www.sgi.com/software/opengl` and
`http://www.sgi.com/software/opengl/manual.html`

2 Course objective

To learn the fundamentals of computer graphics necessary to design and build graphics applications.

3 Grading Method

- Assignments 40%, Quizzes 30%, Final 30%
- There will be four or five quizzes. The lowest grade will be dropped.
- If you have a problem with the grading of an assignment bring your assignment at the latest one week after the assignment has been returned to you.

4 Course organization

- *Programming Assignments:* You will have three programming assignments.

  Good programming style is important.

  Programs must compile without warnings.

  Programs that do not compile will be given zero credit.

  Partial credit will be given (but make sure to comment out portions that do not compile).

  All assignments MUST INCLUDE the following at the top of the first page:

  I certify that this program submission represents my own original work. (name, date)

  Also include SSN, login, lab section number and assignment number.

- *Lectures:* You should read and study the material before class. This should make the course much easier for you.

  Questions during lectures are strongly encouraged.

  You are responsible for knowing the material from both the lectures and the book.

- *Academic dishonesty:* Be forewarned that any cheating (copying programming assignments or homework, allowing programming assignments or homework to be copied, exam cheating, etc) will be punished to the fullest possible extend.

  You are required to read the two handouts on cheating. The one entitled, **Additional Notes on Academic Dishonesty**, must be signed and returned to me.

5 Course Contents

1. Introduction
   (a) Applications and History of Computer Graphics
   (b) Fundamental Elements of 3D Graphics
   (c) The Two Most Common Rendering Algorithms
2. 2D Scan Conversion
   (a) Video Raster Graphics
   (b) Line Drawing
   (c) Polygons and Scan Conversion
   (d) 2D Clipping
3. 3D Geometric Transformations
   (a) Introduction
   (b) Derivations
   (c) Composition and Inversion
   (d) Rotation about an arbitrary axis
   (e) Transformations as a change of basis
   (f) Using transformations
   (g) Coordinate Systems in the Graphics Pipeline
4. Projection and Clipping
   (a) Introduction to Projection Transformations
   (b) Placing the Camera: The Viewing Transformation
   (c) View Volumes
   (d) Derivation of Projection Transformations
   (e) 3D Clipping
5. Visibility
   (a) Back-face Culling
   (b) Visibility Algorithms
6. Illumination Models
   (a) Local Illumination Models
   (b) Global Illumination
   (c) Ray Tracing
7. Other Selected Topics
   (a) Sampling
   (b) Animation
   (c) Volume Rendering