Course Information

Text:

Foley, vanDam, Feiner, and Hughes (1997)
Computer Graphics: Principles and Practice
(second edition in C), Addison-Wesley.

The text was selected as a comprehensive reference, as a suppliment to classroom lectures and discussions, and for access to graphics modeling code. C code for all platforms is available at:

http://www.aw.com/cseng/authors/foley/compgrafix/compgrafix.sup.html

See page 1175 of the text.

The text contains enough material for a year course in Computer Graphics. During the first week of class, we will select the chapters from the text that will form this course.

Evaluation:

Available grades:

non-completion: Incomplete, Withdraw, etc.
completion: A A- B+ B B- C+ (C+ is equivalent to failing)

I will provide three choices of grading structure to each student. Every student must choose one (and only one) of the options by 4/15/99, and notify me in writing as to his/her choice.

Grading Options:

1. Performance Quality: work on assigned readings and exercises
2. Grading Contract: specify a set of behaviors and an associated grade.
3. Negotiation: student and instructor decide upon a personalized grade.

Curriculum Development

Chapter Content **Ratings**

0=omit! 1=little interest 2=moderate 3=high interest 4=include!

1. Introduction _____
2. Simple Raster Graphics _____
3. 2D Raster Graphics Algorithms _____
4. Hardware _____
5. Geometrical Transforms _____
6. 3D Viewing _____
7. Object Hierarchy, PHIGS _____
8. Input and Interaction _____
9. Dialog Design _____
10. User Interface Software _____
11. Curves and Surfaces _____
12. Solid Modeling _____
13. Color and Light _____
14. Visual Realism _____
15. Visible Surfaces _____
16. Illumination and Shading _____
17. Image Manipulation _____
18. Advanced Architectures _____
19. Advanced Geometric Algorithms _____
20. Advanced Modeling _____
21. Animation _____

Course Outline and Structure

Chapters of the text *not* covered in class: {2, 4, 7, 8, 9, 10, 18, 19, 21}

Week 1: Text: Ch 1
Overview: field of Computer Graphics.
Models of space, complex objects.
Curriculum planning.

Week 2: Text: Appendix
CG math: vector spaces, matrices, quaterions
2D raster graphics
Assignmnet 1: math practice

Week 3: Text: Ch. 3, 5
Geometric transformations, coordinate systems
Assignment 2: coordinate transformations

Week 4: Text: Ch 6, 14
Viewing in 2D and 3D, visual realism

Week 5: Text: Ch 12
Solid modeling
Assignment 3: modeling

Week 6: Text: Ch. 15
Visible surfaces
Assignment 4: realism

Week 7: Text: Chs 11
Curves and Surfaces

Week 8: Text: Chs. 13, 16
Lighting, illumination
Assignment 5: color and light

Week 9: Text: Ch 20
Advanced modeling (fractals, particle systems, constraint systems)
Assignment 6: modeling techniques

Week 10: Text: Ch. 17
Image manipulation, closure.

Exercise

Design a software package for Computer Aided Design.

Think about what functionality you would need for constructing CG objects. The low level primitives will let you {draw lines and curves, fill, clip viewpoint} Although simple in 2D, these functions become complex for 3D.

Your tool design should *ignore* user interface and interactivity issues.

Concentrate on which functions you need, the scope of their generality, and the data structures and algorithms which support them.

You might begin by considering a Point. What is needed to construct a single point? What is needed to draw a line? To construct an image of a solid?

SE564 Final Exercise

Hands-on Experience with a Computer Graphics Software Tool

Select a Computer Graphics or CAD tool, and use it to construct an object or animation of interest to you.

Show your work to the class.

Here are some possible tools:

HTML	Building web pages is Computer Graphics, with an emphasis on 2D design.
VRML	3D object in a web-based environment
XML	Same as above, but more modern
AutoCAD	Market leader for CAD design
3D Studio	AutoCAD tools in a 3D animation environment.
Mac3D	As the name says, 3D objects on the Mac
Gerbils!	3D game-like tool from MacOS
RB2Swivel	The original VR toolkit from VPL
Super 3D	Another 3D product
Virtus Walkthrough	For building 3D environments and the touring them.
Alias, Wavefront, SoftImage	High end animation and 3D design tools
Director	3D animation is a scripting environment. High end design.
Sketch!, Photoshop, Freehand, DesignerDraw, MacDraw, KidPix	All are drawing programs, which is also Computer Graphics.
Illustrator, SuperPaint, Deneba Canvas, MacPaint, Pixel Paint	All are painting/drawing tools
Word	Are ascii-grams Computer Graphics?
Excel	Use the cells for pixel-like art, with surprising results
Write-your-own	This is surprisingly easy to do. All you need access to is a DrawLine function, and the matrix package distributed in class.

My tool collection is for the Mac. If anyone has interest in a Mac-based tool, I can provide a educational copy for no cost.