CS3353 Course Outline
Computer Graphics

August 28, 2008

Instructor: John E. Howland
TEXT: "Interactive Computer Graphics A top-down approach with Open GL, 5th Edition" and "OpenGL, A Primer, Third Edition", both by Edward Angel.

1 Course Objectives

- Introduce interactive computer graphics concepts
- Introduce the architecture of computer graphics devices
- Introduce the mathematical representation of graphic images
- Develop graphics programming skills

2 General Information

This course will consist of lectures which will involve classroom use and demonstration of computer graphic concepts together with programming laboratory problems. Our Unix workstations will be the principle laboratory graphics machines, although, other available machines may be used such as Macintosh OS X or other PC's. Laboratory programming will be accomplished using C, C++, J or Scheme programming languages and the OpenGL graphics Application Programming Interface.

3 Examination Schedule

Examinations will be given according to the following schedule. There will be a final examination or a final project and project presentation during the final examination period.

- September 18, 2008
- October 16, 2008
- November 20, 2008
- Final Exam Period, Thursday, December 18, 2:00 p.m., 2008 in HAS 340

4 Laboratory Problems

There will be some assigned laboratory problems. These programs will be submitted in machine readable form. Each program must contain adequate comments and documentation in the source code itself. In addition, each program should include written documentation describing its internal organization, data

structures and operation. This written documentation shall be turned in on the due date for the laboratory problem in hardcopy form. When a program is submitted, it will first be subjected to a series of machine tests. Subsequently, each program will be hand graded. Each problem submission must include a printed listing of the programs. Programs received after the due date, may not be given maximum credit.

5 Class Discussion and Participation

Some class discussion will be conducted outside of class on a local mail list, http://www.cs.trinity.edu/mailman/listinfo/csci335
. Each student should subscribe to the CSCI3353 list and contribute to the discussion when appropriate. Such contributions may include responses to topics posted by others or by posting new discussion topics. The instructor will be reading the list and may contribute discussion topics from time to time. Discussion topics should be limited to the course but may cover any aspect of the course. This discussion list will be archived but not moderated. This means that all of the discussion will be saved so that it can be accessed at any time, but what you post to the group will be seen by all readers in unedited form. It is up to you to engage in friendly conversation and debate. Personal attacks are sure to cause you to be flamed by others and are not encouraged. The mailing list archives may be accessed at http://www.cs.trinity.edu/pipermail/csci3353
. This portion of each student's grade is subjectively determined by such things as correctness of answers to questions and quality of contributed discussion threads as well as class attendance.

6 Grading

Read biology professor Blystone's words (http://www.cs.trinity.edu/~jhowland/blystone-Grades.pdf) on grades.

The approximate breakdown on grading will be as follows. Exams will be used to determine 45% of the final semester grade. Programming homework and class projects will be used to determine 40% of the final semester grade. Class discussion and other subjective measures will be used to determine 5% of the final grade and the final examination will be used to determine the remaining 10% of the final grade.

7 Topics

- Interactive Computer Graphics
  - History
  - Applications
  - Programmer's Model
- Basic Interactive Graphics Programming Models, Picture Description, and Interaction A Simple Graphics Package
  - Graph Plotting
  - Windowing
  - Clipping
  - Segmentation
  - Viewports
  - Character Strings
  - Symbol Layout
  - Data Structures
  - Interactive Programming
  - Input Devices
- Graphics Hardware

  - Display Technology
  - Random Scan Devices
  - Input Devices
  - Rastor Scan Devices

- Implementation of a Simple Graphics Package Geometrical Transformations
  - 2D Transformations
  - Homogeneous Coordinate System
  - Matrix Representation
  - Viewing Transformation
  - Functional Composition of 2D Transformations
  - Efficiency
  - 3D Transformations
  - Homogeneous Coordinate System
  - Matrix Representation
  - Functional Compostion of 3D Transformations
  - Change of Coordinate Systems

- Viewing in Three Dimensions
  - Projections
  - 3D Viewing Transformations
  - Clipping

- Advanced Topics
  - Raster Algorithms
  - Filling Regions
  - Polygon Clipping
  - Algorithms for Removing Hidden Edges and Surfaces