CSCI 4345 - COMPUTER GRAPHICS

CREDIT HOURS: 3
PREREQUISITES: CSCI 3323 or 3341 or 3342; and MATH 1316
GRADE REMINDER: Must have a grade of C or better in each prerequisite course.

CATALOG DESCRIPTION

Overview of the hardware, software and techniques used in computer graphics. Graphics primitives, two-dimensional transformations, painting, windowing and clipping. Three-dimensional graphics including hidden lines and surfaces, lighting, texturing, and shading.

PURPOSE OF COURSE

Develop knowledge of terms and concepts, skills in modeling and rendering using a mid-level API (OpenGL), and visual system design and implementation.

EDUCATIONAL OBJECTIVES

The goal of this course is to have students develop a small interactive graphical system based on student interests or minor area of study. The system is to be designed and implemented using software engineering methods, algorithm and data structure techniques, hardware interface and operating system support, graphical library routines, and program performance considerations. Student progress will be evaluated through the successful completion of progressively more advanced graphics laboratory problems, performance on activities, and success of the term project. Specific skills include:

1. Demonstrate knowledge of design and implementation techniques utilizing complex data structures and algorithms for visual based interactive systems including scene graphs.
2. Develop skills in interface design including modeling, input device control, and screen layout (color, composition, presentation).
3. Explore Scene graphs and WEB-based graphics.
4. Explore graphics techniques including drawing, filling, windowing, clipping, curves, coordinate systems, and transformations in two dimensions.
5. Enhance graphics techniques including drawing, filling, windowing, clipping, curves, coordinate systems, transformations, projections, and hidden line and hidden surface techniques for three dimensions.
7. Enhance visualization skills by exploring texturing, shadowing, ray tracing, and radiosity techniques.

COURSE CALENDAR

This course meets for a minimum of 37.5 lecture contact hours during the semester, including the final exam. Students have significant weekly reading assignments. Students are expected to complete a major project, prepare a class presentation on the project, and 2-3 periodic exams in addition to the final exam. Students are expected to prepare for any class assignments or quizzes over the material covered in class or in the reading material. Successful completion of these activities requires at a minimum six additional hours of outside of classroom work each week.

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Overview of Computer Graphics ................................................................. 2
  Objectives
  Basic principles

Introduction to Computer Graphics Hardware ........................................... 1
  Display devices
  Input/output devices

Design ............................................................................................................. 4
  Story Composition
  Art Design
  Games

OpenGL .......................................................................................................... 6

Design for visual systems (art, story, systems) ........................................... 3

Scene graphs and WEB-base graphics .......................................................... 3

Graphics Systems and Primitives ................................................................. 2
  Library/system support for graphics
  Point plotting
  Straight line drawing
  Curved line drawing

Two-Dimensional Graphics ............................................................................ 6
  Mathematical background and Coordinate System
  Transformations (Translation, Scaling, Rotation)
  Animation
  Approaches (segments vs. direct)
  Filling (Painting)
  Windowing
  Clipping

Three-Dimensional Graphics ....................................................................... 12
  Coordinate System
  Plotting points, lines, and surfaces
  Projections
  Perspective views
  Transformations
  Hidden lines and surfaces
  Shading and texture
  Ray tracing and radiosity

Presentations .................................................................................................. 6

TOTAL 45

REFERENCES

Angel, E., Schreiner, D., Interactive Computer Graphics: A top-down approach with Shader-Based


