

COURSE DESCRIPTION

Department and Course Number: COMP 6400

Course Title: Fundamentals of Computer Graphics

Total Credits: 3

Required: No

Prerequisites: COMP 2710 and MATH 2660

Class meetings per week: 3 hours

Lab meetings per week: 0 hours

Course Coordinator: Dr. Kai Chang

Date Prepared: February 11, 2004

Current Catalog Description:

Graphics hardware and software components, coordinate systems, 2-D and 3-D transformations, 3-D viewing and projections, clipping and windowing, scan conversion and algorithms, visibility determination and shadowing, and software projects using a graphics software package.

Textbooks:

Edward Angel. 2003. *Interactive Computer Graphics – A Top-down Approach with OpenGL, 3rd ed.*. Addison Wesley. ISBN 0-201-77343-0.

References:

OpenGL – a Primer, by Edward Angel, Addison Wesley Pub. 2002.

Course Objectives:

1. Be able to understand fundamentals of graphics hardware and software components.
2. Be able to understand elements involved in constructing a graphics display.
3. Be able to understand mathematics foundation and algorithms for graphics.
4. Be able to design and implement a virtual world using a graphics package, e.g., OpenGL.
5. Be able to design and implement an interactive graphics display and demonstration system.

Prerequisites by Topic:

1. Data structures
2. Linear algebra

Topics Covered: (specify number of hours on each)

1. Graphics systems and models (3 hours)
2. Graphics programming (3 hours)
3. Geometric objects and transformations (6 hours)
4. Input and interaction (3 hours)
5. Viewing (8 hours)
6. Shading (7 hours)
7. Implementation of a renderer (7 hours)

8. Hierarchical and object-oriented graphics (3 hours)
9. Discrete techniques (2 hours)
10. Exams (3 hours)

Laboratory Projects: (specify number of weeks on each)

1. Basic 2-D display (1 week)
2. 2-D transformations (1 week)
3. Conversion to 3D and 3D viewing (2 weeks)
4. Advanced 3-D transformations (2 weeks)
5. Interaction in a 3-D world (2 weeks)
6. Lighting and shading (2 weeks)
7. Animation (2 weeks)

Oral and Written Communications:

All students are required to provide comments of their design along with the source code. Completeness and usefulness of comments are a factor in the grading. In addition, interaction design of each project must be clearly stated in the beginning of the source code.

Social and Ethical Issues:

None.

Theoretical Content:

Mathematical foundations of transformation, projection, rasterization, visibility determination, and algorithm efficiency are developed and applied in the course.

Problem Analysis and Solution Design:

Most assignments are open-ended. Students are required to use their own experience and new materials learned in the class to design a solution that will achieve reasonable display effects and, at the same time, can be implemented within the time allotted.