

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY
Department of Computing and Mathematics
COURSE OUTLINE FOR

Course No.: CS335
Cr Hrs: 3

Title: Introduction to Computer Graphics

Lecture Hours: 3

Laboratory Hours: 0

COURSE DESCRIPTION:

Introduction to computer graphics, algorithms, graphics programming, graphics design, and applications of computer graphics to aviation (business and scientific) problems. Prerequisite: MA241; CS210 or CS215

GOALS:

This course introduces students to basic graphics hardware and familiarizes them with the contents of a typical graphics package; provides detailed analysis of the algorithms used in graphics primitives (point, line, circle, floodfill, scanfill, clip, text output, and C); introduces 2D and 3D transformations (rotate, scale, translate, etc.) including elementary 3D viewing transformations; and provides the opportunity to write a lengthy aviation oriented graphics software project using the C programming language.

PERFORMANCE OBJECTIVES:

1. Write Turbo C (or C++) graphics programs for IBM PS2/8086 compatible microcomputers with CGA graphics capability.
2. Use graphics routines typically found in a graphics library in constructing these programs.
3. Explain the difference between raster and vector scan graphics display tubes.
4. Describe the functionality of various graphics input and output devices.
5. Write a short description of the GKS and PHIGS graphics standards.
6. Explain and implement algorithms for basic graphics manipulations including point, bresenham line and circle, raster and scan fills, text, clippings, etc.
7. Explain and implement attributes of primitives (line color, line style, textangle, etc.)
8. Explain methods of antialiasing.
9. Explain and implement world to viewport mapping.
10. Explain and implement routes for basic 2 space and 3 space object transformation.

11. Explain and implement basic 3 space viewing transformations (parallel and perspective).
12. Use both graphics toolbox and user implemented graphics routines to construct a large aviation related graphics program using the programming language C or C++.

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COURSE OUTLINE FOR CS335, Continued

TEXTBOOK:

Angel, Interactive Computer Graphics: A Top-Down Approach Using OpenGL, Addison-Wesley, 1997.

SUGGESTED SUPPLEMENTAL MATERIALS:

- a. Neider, J. Davis, T. and Woo, M., *OpenGL Programming Guide: the Official guide to learning OpenGL, version 1.1, 2nd edition, Addison-Wesley, 1997.*
- b. Foley, J. Van Dam, A. Feiner, and Hughes, *Computer Graphics in C: Principles and Practice, 2nd edition, Addison-Wesley, 1996.*
- c. Kilgard, M., *OpenGL Programming for the X Windows Systems, Addison-Wesley, 1997.*

PREREQUISITE KNOWLEDGE BY TOPIC:

1. Structured Programming
2. Plane and solid geometry
3. College level algebra
4. Discrete Mathematics
5. Data Structures

TOPIC	CLASS HOURS	COURSE OBJECTIVES
1. Environment Orientation	3	Demonstrate usage by developing programs:
2. Graphics Hardware and Software	4	1. To draw basic points, lines and various curves.
3. Drawing Primitives (Point, Line, Circle, Text)	9	2. Use 2-D and 3-D transformations on objects supplied by instructors
4. Window to Viewpoint Mapping	3	3. Develop animation for objects assigned by instructor.
5. Scan Line Conversion Algorithms	3	4. Use fractal objects to show roughness
6. Flood and Boundary Fill Algorithms	3	5. Use lighting and shading on objects supplied by instructor.
7. 2D Transformations	4	
8. 3D Transformations	4	
9. Viewing Transformations	3	
10. Other Topics Including Programming Project	4	

LABORATORY:

None.

COMPUTER USAGE:

Occasional use as a learning tool in the classroom.

GRADING SYSTEM:

Ongoing programming assignments (every 7-10 days) leading to an integrated graphics project. 2 hour exams and a final exam. This is a programming intensive course: students are expected to program an average of 7-10 hours per week.

ESTIMATED CONTENT:

Skills:	60%
Content:	40%