

ABET COURSE SYLLABUS

ECSE-4750 Computer Graphics

Course Catalog Description:

Introduction to Interactive Computer Graphics, with an emphasis on applications programming. Objects and viewers, and the synthetic camera model. Graphics architectures, the graphics pipeline, clipping, rasterization, and programmable shaders. Input and interaction. Geometric objects, homogeneous coordinates, and transformations. Viewing, hidden surface removal, frame and depth buffers, compositing, and anti-aliasing. Shading, light and materials, texture mapping, ray tracing, and radiosity. Intellectual property concerns. Extensive programming with the OpenGL API and C++. Prerequisite: ECSE-2610 or equivalent. Fall term annually. *3 credit hours*

Pre-Requisite Courses:

ECSE-2610

Co-Requisite Courses:

None

Prerequisites by Topic:

1. Moderate understanding of computer operation
2. Knowledge of a high-level programming language such as C or C++, including the use of pointers
3. Knowledge of basic linear algebra, including eigenvalues

Textbook:

(and/or other required material)

Angel, Interactive Computer Graphics OpenGL, 4th Ed.

References:

Wright, OpenGL Super Bible (WCD) (P), 3rd Ed.,
<http://wrfranklin.org/pmwiki/ComputerGraphicsFall2006>

Course Coordinator:

W. Randolph Franklin, Associate Professor, Electrical, Computer, and Systems Engineering

Overall Educational Objective:

Provide students with a foundation in graphics applications programming.

Course Learning Outcomes:

1. Learn the principles and commonly used techniques of computer graphics
2. Develop a facility with the relevant mathematics
3. Gain an introductory proficiency with OpenGL, one of the most widely used APIs.

How Course Outcomes are Assessed:

Weekly homework (25%)
 Midterm (25%)
 Term Project (25%)
 Final Exam (25%)

Relation to EE/CSE/EPE Outcomes

N = none
M = moderate
H = high

Outcome	Level	Demonstrate Proficiency
	N, M, H	e.g. Exams, projects, HW
Mathematics, science and engineering	H	HW, Exams, Project
Basic disciplines in Electrical Engineering	N	
Depth in Electrical Engineering	N	
Basic disciplines in Computer & Sys. Eng.	M	HW, Exams, Project
Depth in Computer and Systems Eng.	H	HW, Exams, Project
Electromagnetics, electromechanics, power semiconductors	N	
Power system behavior	N	
Electrical energy conversion	N	

Conduct experiments and interpret data	N	
Identify, formulate and solve problems	N	
Design a system, component or process	M	HW, Project
Communicate in written and oral form	M	HW, Project
Function as part of a multi-disciplinary team	M	Project
Preparation for life-long learning	N	
Ethical issues; safety, health, public welfare	N	
Humanities and social sciences	N	
Laboratory equipment and software tools	H	HW, Project
Variety of instruction formats	N	

**Topics Covered:
(number of hours or classes for each)**

1. Introduction to Interactive Computer Graphics, with an emphasis on applications programming. (2 classes approx)
2. Objects and viewers, and the synthetic camera model. (2 classes approx)
3. Graphics architectures, the graphics pipeline, clipping, rasterization, and programmable shaders. Input and interaction. (5 classes approx)
4. Geometric objects, homogeneous coordinates, and transformations. (4 classes approx)
5. Viewing, hidden surface removal, frame and depth buffers, compositing, and anti-aliasing. (6 classes approx)
6. Shading, light and materials, texture mapping, ray tracing, and radiosity. (5 classes approx)
7. Intellectual property concerns. (1 classes approx)
8. Extensive programming with the OpenGL API and C++. (3 classes approx)

Computer Usage:

Extensive OpenGL programming, preferably in Linux. However, since OpenGL is platform independent, other operating systems may also be used.

Laboratory Experiences:

1. several OpenGL programs

Design Experiences:

1. designing several OpenGL programs for homeworks
2. designing a bigger program for the term project

Independent Learning Experiences:

1. term project optionally in teams of 3, worth 25% of grade.

Class/Lab Schedule:

Lectures MR2-3:20, lab W2-4

**Contribution to the
Professional Component:**

- | | |
|---|------------------|
| (a) College-level mathematics and basic sciences: | 1.5 credit hours |
| (b) Engineering Topics (Science and/or Design): | 1.5 credit hours |
| (c) General Education: | 0 credit hours |

Prepared by:	WR Franklin
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