COURSE DESCRIPTION

Dept., Number	CSci 581	Course Title	Special Topics in Computer Science I: 3D Computer Graphics
Semester hours	3	Course Coordinator	Philip J. Rhodes, Assistant Professor

Current Catalog Description

Special topics in computer science.

Note: This course was last offered in the Spring 2007 semester, and was open to both graduate and undergraduate students. This course is being recast as CSci 391 for the Fall 2008 semester, covering similar subject matter.

Textbook

Alan Watt. *3D Computer Graphics*, Addison-Wesley, 2000.

References

Course Outcomes

Upon successful completion of this course, the students are able to:

1. explain and implement three-dimensional transformation matrices;
2. explain and implement vectors and vector operations such as the dot and cross products;
3. explain and implement the *Object Space*, *World Space*, *View Space*, *Screen Space* and *Image Space* coordinate systems and their relationships to each other;
4. explain and implement the *Phong Lighting Model;*
5. explain and implement linear interpolation;
6. explain and implement *Flat Shading, Gouraud Shading, and Phong Shading;*
7. explain and implement triangle *rasterization*;
8. explain and implement the *Z-Buffer* hidden surface removal algorithm;
9. explain and implement *backface culling;*
10. explain and implement polygon clipping.

Relationship between Course Outcomes and Program Outcomes

The course outcomes contribute to the program outcomes as follows: (1,2,3,5) to (a), (1-10) to (b,c,i,j,k),

Prerequisites by Topic

The official prerequisites for CSci 581 are CSci 211 (Computer Science III) and CSci 223 (Computer Organization and Assembly Language). However, the students in this section should also have a mathematics background with at least introductory differential and integral calculus (Math 262).

Major Topics Covered in the Course

1. 3D and 4D vectors, vector operations, and transformation matrices
2. *Object Space*, *World Space*, *View Space*, *Screen Space* and *Image Space* coordinate systems and their relationships to each other
3. Lighting/shading
4. Triangle *rasterization*
5. Hidden surface removal
6. Polygon clipping.

Assessment Plan for the Course

This is an elective course offered approximately every two years. An offering typically has 2 examinations and 9-10 challenging programming assignments. Outcomes are directly addressed by the assignments, and by the examinations..

How Data in the Course are Used to Assess Program Outcomes (unless adequately covered already in the assessment discussion under Criterion 4)

Estimate Curriculum Category Content (Semester hours)

Area	Core	Advanced	Area	Core	Advanced
Algorithms		0.5	Software design		0.75
Data structures		1.5	Concepts of programming languages		