

## COURSE DESCRIPTION

Dept., Number	CSci 391	Course Title	Computer Graphics
Semester hours	3	Course Coordinator	Philip J. Rhodes, Assistant Professor

### Current Catalog Description

Introduction to the fundamentals of computer graphics, including elementary figures, shading, geometric transformations, graphics program design, and interactive techniques.

### 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

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| <ol style="list-style-type: none"> <li>1. Basic data structures and algorithms (CSci 112, 211)</li> <li>2. Intermediate programming concepts and skills (CSci 211)</li> <li>3. Fundamental computer architecture concepts (CSci 223)</li> <li>4. Introductory differential and integral calculus (Math 262)</li> </ol> |
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Major Topics Covered in the Course

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| <ol style="list-style-type: none"> <li>1. 3D and 4D vectors, vector operations, and transformation matrices</li> <li>2. <i>Object Space, World Space, View Space, Screen Space</i> and <i>Image Space</i> coordinate systems and their relationships to each other</li> <li>3. Lighting/shading</li> <li>4. Triangle <i>rasterization</i></li> <li>5. Hidden surface removal</li> <li>6. Polygon clipping.</li> </ol> |
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Assessment Plan for the Course

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

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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		