

COURSE NUMBER AND TITLE:

cap4730 Computational Structures in Computer Graphics

OVERVIEW:

This is an advanced undergraduate course on the concepts and principles underlying interactive gaming and graphics environments.

The goal is to be able to build, not just use such environments, including the lighting and modeling of geometry. To make the concepts and principles concrete and prepare students for the workplace or graduate studies, the course uses the industry-standards of OpenGL and C/C++. In particular, students are expected to work with, understand and modify OpenGL example programs. Students will also benefit from refreshing their knowledge of linear algebra and calculus to understand structures rather than just examples.

PREREQUISITES:

Familiarity with programming using a high-level language; familiarity with OpenGL is not assumed; basic knowledge of algorithms, data structures and discrete math. Understanding matrix operations, curves and surfaces.

TEXTBOOK:

class notes

OUTLINE OF COURSE TOPICS:

Introduction & test  
OpenGL  
Curves  
Interaction

polyhedra + basic geometry  
3D data structures  
basic 3D viewing, coordinates  
Modeling Hierarchy  
Projection

Surfaces  
Textures  
Z-buffer & Smooth shading  
Graphics Pipeline

EXAMINATIONS AND GRADES:

Six tests (50% of final grade)  
Three projects (50% of final grade)  
Homework assignments in the early part of the course.

WORKLOAD: Students who take this course comment that the course uses (and motivates) earlier CS and Math course work (see prerequisites). Familiarity with programming is expected.