

Computer Science 805
Advanced Modeling Techniques in Computer Graphics
Spring 2002
Syllabus

Instructor

Dr. Timothy Davis
Edwards Hall 437
656-0309
Office hours: MW 3:30-4:30 (or by appointment)
tadavis@cs.clemson.edu

Class Meeting Times

TTh 3:30-4:45 Jordan G32

Course Webpage

<http://www.cs.clemson.edu/~tadavis/cs805/>

Textbooks

Peter Shirley, *Realistic Ray Tracing*, A. K. Peter, Ltd., 2000. (required)

Andrew Glassner, ed., *An Introduction to Ray Tracing*, Academic Press, 1989. (optional)

Alan Watt and Mark Watt, *Advanced Animation and Rendering Techniques: Theory and Practice*, Addison-Wesley, 1992. (optional)

Mason Woo, Jackie Neider, and Tom Davis, *OpenGL Programming Guide: The Official Guide to Learning OpenGL (Second Edition)*, Addison-Wesley, 1997. (optional)

Grading

Final grades will be based on programming assignments, a midterm test, and a final exam with appropriate weights based on difficulty. The midterm and/or final may be an in-class test, a programming assignment, or an in-class presentation.

Letter grades will be based on a 10-point scale.

Class Cancellation

Students are expected to wait for 15 minutes after the class beginning time before leaving if the instructor is late.

Programming Assignments

Programming assignments will constitute the majority of your grade for the course. Each of these assignments should follow the guidelines listed below.

- **Webpage** A webpage with your solution to the assignment must include:
 - Description of the problem
 - Description of the solution
 - Source code with documentation
 - User's guide
 - Images produced by your code

- **In-class Demonstration** You should create a presentation for the class that shows the images you produced and explains some of the problems you encountered.
- **Late Work** Late assignments will be accepted with penalty deemed appropriate.
- **Independent Work** You must work on projects independently. Cheating of any kind will not be tolerated and will result in significant penalties.

Course Description

The course will cover computer graphics methods, data structures, analysis of algorithms, and selected implementation examples, generally coinciding with the main programming assignments assigned throughout the term.

- Basic Ray Tracing
 - intersection tests
 - ray/sphere intersection
 - viewing planes
 - data structures
 - ppm files
- Intermediate Ray Tracing
 - spherical inverse mapping
 - ray/plane intersection
 - ray/polygon intersection
 - convex quadrilateral inverse mapping
 - quadrics
 - reflection
 - refraction
 - shading and illumination
 - shadows
 - bump mapping
- Advanced Ray Tracing
 - antialiasing with supersampling
 - distributed ray tracing
 - soft shadows
 - motion blur
 - depth of field
 - acceleration techniques
 - bounding volumes
- Other Topics
 - fractional Brownian motion
 - fractals
 - terrain generation
 - particle systems
 - data structures
 - collision detection
 - forces
 - Lindemayer systems
 - plant generation