

Computer Science 805
Advanced Modeling Techniques in Computer Graphics
Spring 2005
Syllabus

Instructor

Dr. Timothy Davis
McAdams 303
656-0309
Office hours: T 5:00-6:00, W 3:00-4:00 (or by appointment)
tadavis@cs.clemson.edu

Class Meeting Times

TTh 3:30-4:45 Daniel 415

Course Webpage

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

Textbooks

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

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

Henrik Wann Jensen, *Realistic Image Synthesis using Photon Mapping*, AK Peters, Ltd., 2001. (optional)

John Marlon, *Focus on Photon Mapping*, Muska & Lipman/Premier-Trade, 2003. (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.

The date for the final is Friday 5/6, 6:00.

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

Class Cancellation

Students are expected to wait for 20 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
 - user's guide
 - images produced by your code
- **Submission of Code** You must submit your documented code, along with a makefile, to me by e-mail (more details later).
- **In-class Demonstration** For some projects, you will be required to 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**
 - ray/sphere and ray/plane intersection
 - viewing planes
 - shading and illumination, shadows
 - data structures
 - ppm files
- **Intermediate Ray Tracing**
 - ray/polygon and ray/quadric intersection
 - spherical inverse mapping, convex quadrilateral inverse mapping
 - reflection and refraction
 - bump mapping
- **Advanced Ray Tracing**
 - antialiasing
 - distributed ray tracing
 - soft shadows
 - motion blur
 - depth of field
 - acceleration techniques
 - bounding volumes
- **Other Topics**
 - photon mapping
 - fractional Brownian motion
 - particle systems
 - Lindemayer systems