

**Computer Science 805**  
**Advanced Modeling Techniques in Computer Graphics**  
**Spring 2004**  
**Syllabus**

**Instructor**

Dr. Timothy Davis  
Edwards Hall 437  
656-0309  
Office hours: TTh 3:30-5:00 (or by appointment)  
tadavis@cs.clemson.edu

**Class Meeting Times**

TTh 12:30–1:45 Jordan G32

**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)

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.

The date for the final is Friday 4/30, 1:00-4:00.

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