

CS405/805-001, Fall 2012

Computer Graphics

Instructor: Xue Dong Yang
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Lecture Time: T,R/11:30AM-12:45 PM
Location: CL 410
Midterm: TBA (Around late October)
Final Exam: None
Office Hours: T/10:30AM-11:30AM, W/1:30PM-2:30PM, R/1:30PM-2:30PM
Other time by appointment

Textbook: Selected Journal, Conference Papers and lecture Notes

Grading Scheme:	Assignments	3 X 10% = 30%
	Midterm	30%
	Presentation	20%
	Project	20%
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	TOTAL	100%
	Instructor's discretion +/- 5%	

Outline of the Class:

Course Contents:

- 3D viewing transformations:
 - Overview of coordinate systems in 3D computer graphics
 - Homogeneous coordinates
 - Basic transformation matrices
 - 3D viewing transformation matrix: method I
 - 3D viewing transformation matrix: method II
 - Other transformation matrixes
 - Assignment 1: construction of transformation matrices
- Rendering techniques:
 - Basic illumination models
 - Overview of the Three Generations of Rendering Techniques:
 1. First Generation (60's-70's): Polygon scan-converting
 2. Second Generation (80's -): Ray-tracing
 3. Third Generation (90's -): Radiosity
 - Ray construction

- Intersection between ray and elementary geometric shapes
- Overview of acceleration techniques for ray-tracing
- Assignment 2: Implementation of the basic ray-tracing algorithm
- Volume Rendering
 - Shading principle for 3D density functions
 - Sampling and interpolation of discrete 3D density data
 - Integration of semi-transparent values along a ray
 - Volume rendering algorithm for discrete 3D density data (CT, MRI, etc)
 - Assignment 3: Implementation of the basic volume rendering algorithm
- Advanced modeling techniques for complex phenomenon
 - Particle systems (e.g. water, smoke, etc.)
 - Hypertexture
- Midterm Exam.

Student Presentation:

- Each student will give one presentation on a related topic based on one or more journal/conference paper(s).
- A list of papers will be provided. In addition, student may suggest papers outside the list.
- Topic for each student must be pre-approved sufficiently ahead of the presentation.
- To make the marking uniform and easy, a suggested structure, format and marking criteria for presentation will be provided.

Project:

- Each student is required to do a programming type project.
- A theoretical type project may be considered upon approval.
- Students are encouraged to do a project related to their own thesis research topics.
- There will be a minimum requirement for the scope and technical depth of the project.