CS 348B	January 10, 1995
Winter ’95	Handout #1
Pat Hanrahan	

COS 348B Computer Graphics: Image Synthesis Techniques

Time and Place: Tue/Thu 9:30-10:45 McC 134

This course will provide a broad overview of the theory and practice of rendering. Classic rendering algorithms will be covered, however, the much of the course will cover current results in physically-based rendering algorithms.

Syllabus

Jan 10	What is Rendering?
Jan 17	Classic Algorithms: Zbuffering, Scanline, Reyes
Jan 19	Ray Tracing I: Basic formulation, Intersection
Jan 24	Ray Tracing II: Acceleration, Visibility
Jan 26	Ray Tracing III: Sampling and Antialiasing
Jan 31	Radiometry and Photometry I
Feb 2	Radiometry and Photometry II
Feb 7	Spectral Representations
Feb 9	Camera simulation
Feb 14	Reflection Models I: Diffuse
Feb 16	Reflection Models II: Glossy
Feb 21	Texture Mapping I: Basics
Feb 23	Texture Mapping II: Polygons
Feb 28	The Rendering Equation
Mar 2	Radiosity I: Form Factors, Solvers
Mar 7	Radiosity II: Finite Element Methods, Meshing, Hierarchical
Mar 9	Monte Carlo Methods I: Probability
Mar 14	Monte Carlo Methods II: Variance reduction
Mar 16	Hybrid Methods or Volume Rendering

Prerequisites

Attendees should have a working knowledge of computer graphics (at the level of CS248 and CS348A). In particular, you should fully understand the basic 3D display pipeline, viewing and modeling transformations, simple geometric modeling using polygins and quadrics, and hidden surface algorithms like the z-buffer algorithm.

Solid knowledge of integral calculus and basic geometric algorithms is an absolute must. Some exposure to signal processing and probability is also assumed.

Texts:

An Introduction to Ray Tracing Edited by Andrew Glassner, Academic Press, 1989.

Radiosity and Realistic Image Synthesis Michael Cohen and John Wallace, Academic Press, 1993.

Additional readings will be assigned from research monographs, papers from current journals and conference proceedings, and excerpts from conference tutorials.

The above textbooks and all reading materials will be on reserve in the Math/Computer Science Library.

Assignments and Grading:

Assignments will consist of 3 problem sets and 3 programming projects.

Programming projects must be done on SGI workstations. These workstations have high resolution 24-bit color displays, and special purpose hardware for real-time 3D graphics. Sweet Hall 026 has a cluster of 15 Indigos (100Mhz R4000 processor, 60K polygons/sec), and Margaret Jacks Hall Level 0 has a cluster of 10 Personal Irises (35Mhz R3000 processor, 27K polygons/sec). Access to the building after hours requires the same key that opens the outside doors of Margaret Jacks Hall. If you do not have such a key, see the Computer Science Department receptionist. Sweet Hall is open to all Stanford students.

The programming assignments count 2/3 of your final grade, the written assignments 1/3. There will be no exams. All assignments should be turned in in the bin outside Lilian Betters' office.

Staff:

Instructor: Pat Hanrahan
Office: CIS 127
Hours: Tue/Thu 11-12
Mail: hanrahan@cs

TA: Eric Veach
Office: Cedar Hall, Office B10
Hours: TBA
Phone: 723-0033
Mail: ericv@cs

Secretary: Lilian Betters
Office: CIS 036
Mail: lilian@mojave
Phone: (415) 725-3651
Hours: M-F 8:30 am - 4:30 pm