

CSC 572 Computer Graphics (graduate level) Syllabus

Professor: Zoë Wood

Office: Building 14, room 209

Phone: 756-5540

office hours: T&Th 11-12 (W 2-3 online)

email: zwood@calpoly.edu

Schedule: T-Th lecture 3:10-4:30 lab 4:40-6:00pm

Location: lecture & lab: 14-232B

General: This course will expose you to research in computer graphics related to geometric models (acquisition, reconstruction, representation, enhancement: simplification, representation, and texturing). **This course requires substantial math and programming skills.** In particular it will be helpful if students are familiar with linear algebra and writing 3D computer graphics programs in OpenGL.

Assignments:

- One in class presentation about a current research paper from the instructor provided list of papers (20% grade)
- One larger final programming project of the student's choice approved by the instructor. (35% grade)
- Weekly quizzes or lab assignments related to the lecture material and papers. (35% of grade)
- Participation in seminar discussions! (10% grade)

Text: We will be primarily reading research and survey papers published in computer graphics related journals and conferences. See next page for the list of papers.

The following is a *tentative* schedule for topics and assignments

Week 1	3/30/10	Class cancelled	
	4/1/10	Introduction to course and general CG	
Week 2	4/6/10	Overview of tasks in CG – what makes a good model	
	Read	<i>Implicit Surfaces (Bloomenthal)</i>	
	4/8/10	Introduction to volumes and implicit surfaces	
	Read	<i>Marching cubes (Lorenson & Cline)</i>	Lab 1
Week 3	4/13/10	Model acquisition:VRIP	
	Read	<i>Vol. Method for Build (Curless & Levoy)</i>	
	4/15/10	Model Acq. & representation: IBR	
	Read	<i>Modeling & Render Arch (Debevec, et. al.)</i>	
Week 4	4/20/10	Enhancement: simplification	
	Read	<i>Progressive Meshes (Hoppe)</i>	Lab 2
	4/22/10	Enhancement:simplification	
	Read	<i>Surface Simp using quad (Garland, et. al)</i>	Lab 3
Week 5	4/27/10	Enhancement:simp & representation	
	Read	<i>Dual contouring of Hermite (Ju, et. al.)</i>	Final proj proposal mtgs
	4/29/10	Surface rep: NURBS & subdivision	
	Read	<i>Sub-div course notes & book TBA</i>	Quiz
Week 6	5/4/10	Surface rep: NURBS & subdivision	
	Read	<i>Sub-div course notes & book TBA</i>	Lab 4
	5/6/10	Enhancement: representation: NURBS	
	Read	<i>Fitting Smooth Surfaces (Krishnamurthy & Levoy)</i>	
Week 7	5/11/10	Enhancement: representation: Normal maps	
	Read	<i>Gen. method for preserve. attribute(Cignoni, et. al)</i>	Lab 5
	5/13/10	Texture synthesis	
	Read	<i>Lapped textures (Praun, Finkelstien & Hoppe)</i>	Lab 5 continued
Week 8	5/18/10	Sci viz – perception & photo & non-photo	
	Read	<i>Line Drawings from Volume Data</i> (Burns, Klawe, Rusinkiewicz, Finkelstein and DeCarlo) <i>Diffusion Tensor MRI Visualization (chpt)</i>	Quiz
	5/20/10	FURLOUGH DAY	
	Read		
Week 9	5/25/10	Sci viz –uncertainty & interpolation	Final proj. check-in

	Read	<i>Approaches to uncertainty visualization (Pang, Witenbrink & Lodha) & ?</i>	
	5/27/10	Sci viz – Flow&Terrain	Final proj check-in
	Read	<i>Imagine Vector Field Using Line Integral Convolution (Cabral) & Terrain Simplification (Lindstrom & Pascucci)</i>	
Week 10	6/1/10	Rendering- Photon mapping	
	Read	<i>A Practical Guide to Global Illumination using Photon Map" (H. Jensen., et al)</i>	Quiz
	6/3/10	Rendering - PRT	Final project check-in
	Read	<i>Precomputed Radiance Transfer for RT Rendering in... (P-P. Sloan, et.al)</i>	Quiz
Final	6/10/10	Thursday 4:10-7pm	Final In class assessment

We will be reading the following papers for this class:

Implicit Surfaces by Jules Bloomenthal p 1-18 (**surface representation intro.**)

Marching Cubes: A High Resolution 3D Surface Construction Algorithm, William E. Lorensen and Harvey E. Cline; SIGGRAPH '87 (**representation volume**)

A Volumetric Method for Building Complex Models from Range Images, Curless & Levoy; Siggraph 1996 (**acquisition**)

Modeling and Rendering Architecture from Photographs: A Hybrid Geometry- and Image-Based Approach, Debevec. P., Taylor, Malik, Siggraph 1996 (**acquisition & representation:IBR**)

Progressive Meshes, Hugues Hoppe, Siggraph 1996 (**surface representation/enhancement:simplification**)

Surface Simplification using Quadric Error Metrics, M. Garland and P. Heckbert, SIGGRAPH 1997 (**enhancement:simplification**)

Dual Contouring of Hermite Data, Ju, Losasso, Schaefer & Warren; SIGGRAPH 2002 (**volume representation/enhancement:simplification**)

Robust Repair of Polygonal Models, T. Ju, , SIGGRAPH 2004 (**enhancement: repair**)

Some chapters and notes provided about curves, NURBS and subdivision surfaces

Fitting Smooth Surfaces to Dense Polygon Meshes, Krishnamurthy and Levoy, SIGGRAPH 1996 (**enhancement: representation**)

A general method for preserving attribute values on simplified meshes, P. Cignoni, C. Montani, C. Rocchini, R. Scopigno, IEEE Visualization 1998 (**enhancement: representation**)

Lapped textures (Praun, Finkelstien & Hoppe)

[Line Drawings from Volume Data](#) (Burns, Klawe, Rusinkiewicz, Finkelstein and DeCarlo)

Non-Photorealistic Volume Rendering Using Stippling Techniques (Lu, Morris & Ebert)

Terrain Simplification (Lindstrom & Pascucci)

Imagine Vector Field Using Line Integral Convolution (Cabral)

Approaches to uncertainty visualization (Pang, Witenbrink & Lodha)

A Practical Guide to Global Illumination using Photon Map" (H. Jensen., et al)

Precomputed Radiance Transfer for RT Rendering in... (P-P. Sloan, et.al)