

**CSC – CPE 476++: Real-time 3D Computer Graphics Software Systems & Senior
Project
Syllabus**

Professor: Zoë Wood

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Schedule: T/TH Lab 3:10-4:30pm Lecture 4:40-6pm

Location: lecture: 186-C102 & lab: 14-255

General: Welcome to 3D gaming. This course will teach you *some* of the important computer graphics principals of 3D games. This course is primarily focused on the graphics components of interactive 3D games/worlds. We will cover advanced real-time graphics techniques mostly in the context of games. **This course requires substantial math and programming skills.** Experience with C or C++ will be essential and experience with linear algebra will be very helpful. We will be using OpenGL for our graphics APIs, along with C++ to create computer graphics games throughout the quarter.

This year CSC 476 will be a two-part course, which will serve as your senior project. This two-quarter team design and development experience will satisfy your senior project requirement. Students will form teams of 4-8 people and those teams will work together over two quarters to build complete games.

Enrollment will consist of CSC 476 in Winter 2011 and then a required follow-up enrollment in CSC 491 + CSC 492 (concurrently in Spring with Professor Wood). These special sections of CSC 491+492 will consist of a standard lecture and lab period in order to cover all the materials relevant to completing your game project. Please only enroll in 476 in Winter if you plan to commit to continue your work with your team as your senior project in Spring 2011.

For the first quarter, in 476, teams will aim to design and develop a robust playable proto-type, which will then be tested and perfected in Spring 2011.

Platform: The labs will be held in 255 but you are welcome to develop your programs under alternative operating systems, etc. as long as the final programs can be demonstrated and run on multiple machines for the final game play demo.

Assignments for 476:

- 2 mid-term exams (20% of final grade)
- 3-4 lab/programming exercises (17% of final grade – 2-4% each)
 - OpenGL & C++ application

- One larger team final programming project, your team game proto-type (55% of final grade)
 - of your team’s choice (again using OpenGL and C++)
 - project must be approved by the instructor (see final project proposal & rubric)
 - teams will be 4-8 people – see instructor for exceptions
 - all teams must meet quarter deadlines (see syllabus for tentative deadlines)
 - Note that assessment will be made via input from team members.
- Final game play assessment (5% of final grade)
- Participation (3% of final grade)
 - attend class and talk in class, lab or office hours interaction

Please see the program description for deadline details. There is a strict late policy for all assignments – **no late programs/project demos will be accepted.**

Text: “Real-time rendering” (2nd Edition) Tomas Akenine-Moller and Eric Hanes (**highly recommended**)

Recommended: Any good OpenGL reference, (e.g. “OpenGL: A primer” by Edward Angel or “OpenGL: programming guide” by OpenGL ARB)
 “Making Comics” and “Understanding Comics” by Scott McCloud

Honesty: Do not take unfair advantage of your classmates. Plagiarism, cheating, and other forms of academic dishonesty will be reported and can have very serious consequences for your academic career. You will be failed from this class and a letter will be put in your file with Cal Poly Judicial Affairs if you cheat. All exams and quizzes are individual efforts. Labs and programming assignments will be specified as either individual or pair/team assignments. Do not cut and paste from online tutorials.

The following schedule for the lectures and assignments may change and is provided to give you a rough outline of the topics we will cover and the timings of your final project reviews. Note that the pairing of reading with topics will likely not change and you are strongly encouraged to use the book as a resource! In other words read the related chapters!

Week 1	1/4/11	Introduction – Games & Design	
	1/6/11	Game pitches to form teams	
	Read	<i>Chpt. 2 from RTR (&Chpt. 3 if necessary)</i>	
Week 2	1/11/11	Graphics pipeline review	
	Read	<i>Chpt. 2 from RTR (&Chpt. 3 if necessary)</i>	
	1/13/11	Geometry in games – characters, terrain & acceleration	Game Proposal Presentat
	Read	<i>Chpt. 9 & 11 in RTR</i>	
Week 3	1/18/11	Performance – spatial data structures	Lab 1 due
	Read	<i>Chpt. 9 from RTR</i>	

	1/20/11	Performance – view frustum culling	
	Read	<i>Chpt. 9 from RTR</i>	
Week 4	1/25/11	Geometry in games – level of detail I	
	Read	<i>Chpt. 11 in RTR</i>	
	1/27/11	Geometry in games – level of detail II	Lab 2 due
	Read	<i>Chpt. 11 in RTR</i>	
Week 5	2/1/11	Performance and Geometry review	
	Read	<i>Chpt. 2 & 9 & 11 from RTR</i>	
	2/3/11	Midterm 1	25% Final project
	Read	<i>Your notes from lecture</i>	
Week 6	2/8/11	Lighting review & texture review	
	Read	<i>Chpt. 4.1-4.3 in RTR & ppt slides</i>	
	2/10/11	Texturing methods (e.g. light mapping)	
	Read	<i>Chpt. 5.4-5.7 in RTR</i>	
Week 7	2/15/11	Texturing methods (environment & bump mapping)	
	Read	<i>Chpt. 5.4-5.7 in RTR</i>	
	2/17/11	Lighting in games– vertex & pixel shaders	50% Final project
	Read	<i>Chpt. 6 in RTR</i>	
Week 8	2/22/11	NO CLASS (MONDAY SCHEDULE)	
	Read	<i>Chpt. 6 in RTR</i>	
	2/24/11	Lighting in games - shadows	
	Read	<i>Chpt. 6.12 in RTR</i>	Lab 3 due
Week 9	3/1/11	Effects in games – particle systems, billboarding	
	Read	<i>Chpt. 8 from RTR</i>	
	3/3/11	Performance – alternative rendering	
	Read	<i>Chpt. 9 from RTR</i>	75% Final project
Week 10	3/8/11	Performance – pipeline optimization	
	Read	<i>Chpt. 10 from RTR</i>	
	3/10/11	Midterm 2	
	Read	<i>Your notes from lecture</i>	90% Final project
Final	3/17/11	Thursday 7:10-10pm**	100% Final project