Graphics II Course Syllabus

Contact Information

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Office Hours: I generally accept walk-ins before GX1 lectures, see the GX1 course syllabus for more details.

Lab Instructors: Dan Fernandez, JC Park, Mystery Guest

Course Information

The Graphics II class builds and expands upon the core concepts taught in the Graphics I class. Each day students will be introduced to powerful new features and techniques available on modern 3D hardware. Students will create a solo 3D project to practice their new found skills. During the class there will be multiple checkpoints throughout the month used to show progress. Students will be exposed to a broad variety of techniques used in the Video Game and Simulation industries to create attractive 3D visuals. Many of these techniques will then be applied in their own projects to help reinforce understanding.

Topics

Discover how light & shadow enhance visual depth and realism.
Learn about the new kinds of shaders available on modern hardware.
Build a unique 3D solo project to practice new found skills.
Apply powerful API based optimizations to get the most from your 3D hardware.
Delve into advanced techniques used in the video game & simulation industries.

Textbook

This class requires two text books: ***Practical Rendering & Computation with Direct3D11*** and ***Mathematics for 3D Game Programming and Computer Graphics***.

Required Development Software

Visual Studio 2012 or greater, Git Version Control System, Microsoft Office

Grading

Type	Weight
Professionalism	10%
Graphics Project	66%
Programming Exam	24%

Graphics II Course Syllabus

Graphics Project
Course Lab & home work in Graphics II is in the form of a graphics project which encompasses cumulative features to be added to the project throughout the course. These features are broken down and outlined in the project documentation & rubric. As the class covers more features and capabilities of the software API as well as standard techniques and algorithms commonly used in real time graphics related software you will be expected to implement these within your project to accumulate portions of your project grade. The project will be broken into three milestone check points during the course. Each Milestone will amount to a 3rd of your project grade or 22% of your course grade. **Features may be added in excess of any one milestone grade to carry over towards your Programming Exam Grade as a buffer.**

Programming Exam
The Programming Exam will require you to demonstrate your knowledge and capability writing a graphics within a set period of time. You will be provided with an example program in which you must emulate up to an acceptable degree for the full exam grade. **There is no partial credit on this exam.**

Academic Dishonesty
This course encourages students to share high-level knowledge about graphics programming and the Direct3D API. Because of this we must have very clear rules about what we consider appropriate VS inappropriate behavior between students.

Students must perform work individually. There are no teams in this course, and students may not share any code. Any sharing of code will be considered cheating regardless of the source.

Academic Dishonesty will be dealt with strictly. Cheating comes in many forms. Sharing / copying of code, "borrowing" of code ideas resulting in similar code structure, discussing code structure, looking at code from another student or providing such code, and plagiarism, in addition to other dishonest behaviors, are all considered academic dishonesty. From time to time lab instructors may offer help to students beyond a conceptual level. Lab instructors have been given explicit instructions about how and when such information may be shared, but students are NEVER permitted to provide such information. No information may be shared by students except at a conceptual level. Any student found to have violated these rules, whether a provider or receiver or unauthorized help, will be given a zero and referred to the Student Affairs office and GPS coordinator. **When in doubt, ask an instructor.**

Graphics II Course Syllabus

Absences will be observed in accordance with Full Sail policy. Students absent from nine hours of the course or more will automatically receive a failing grade. Due to the intense nature of the course, students are advised to avoid missing class.

Only class-related computer activity is permitted. This means no game-playing, web-surfing, instant messaging, or other unrelated activities are allowed during class. The only computer activity during lecture should be the examination of class materials (manuals, demonstrations, and the like.) Please save other activity for breaks. For each violation, ***your professionalism score will be docked.***

Short breaks will be given every hour, and a 45-minute break will be given for lunch. We will have discussion of the topics during the class period, an hour lunch, and a lab afterwards. Regardless of when we break for lunch, you may take up to an hour. If you wish to, you may return from your break at the regularly scheduled beginning of lab.

Class Schedule

Day 1	Lecture	Introduction, Setup Git, API Mathematics, Theory Review
	Lab	Desired Checkpoint: Create a base graphics project
Day 2	Lecture	Normals, Lighting Algorithms & Per-Pixel Lighting, Model Loading
	Lab	Desired Checkpoint: Load Model & demonstrate 2 types of lighting
Day 3	Lecture	Geometry Shaders and Stream Output, Instancing, Non-Interleaved Vertex Buffers
	Lab	Desired Checkpoint: Milestone Grade 1
Day 4	Lecture	Viewports, Render to Texture, Multiple Render Targets
	Lab	Potential Checkpoint: 3D Scene within a 3D scene
Day 5	Lecture	Advanced Shaders: Branching Logic, Inheritance, Normal Maps, Specular Maps, & Ambient Occlusion
	Lab	Potential Checkpoint: Dynamic Geometry
Day 6	Lecture	Multi Threaded Rendering, Stencil Buffer, Alpha to Coverage
	Lab	Desired Checkpoint: Milestone Grade 2
Day 7	Lecture	Tessellation Applications & Frustum Culling on the GPU
	Lab	Potential Checkpoint: Distance based LOD
Day 8	Lecture	Compute Shaders & Indirect Rendering
	Lab	Potential Checkpoint: Student's Choice
Day 9	Lecture	Advanced Lighting Techniques, Shadow Maps, Post Processing
	Lab	Potential Checkpoint: Dynamic Lighting

Graphics II Course Syllabus

Day 10	Lecture	HDR Rendering, Tone Mapping
	Lab	Desired Checkpoint: Milestone Grade 3
Day 10.5	Final	Practical Programming Exam