Syllabus v1.3
(Schedule subject to change)

CS174A – Introduction to Computer Graphics - Fall 2014

TTh –4-6pm, Royce 190

Instructor: Scott Friedman (friedman@ucla.edu)
Office: 3344 Math Science Building, Phone: x58607
Office Hours: Tuesday and Thursday by Appointment Only

TA: Xiaolong Jiang (xjiang@cs.ucla.edu)
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Text: Interactive Computer Graphics 7th ed., Angel and & Shreiner [ICG]

Summary:

This class is an introduction to interactive computer graphics. Final grades will be determined by a point system. Points will be awarded through project assignments, a mid-term and a final exam and your participation. The exams are optional in that if you feel you are collecting enough points to achieve the grade you desire you can skip one or both of the exams. The course will be graded on a straight "curve" so you are not competing with each other and are encouraged to help each other. If you do the work you should pass this class – if you put in some effort in you should do even better. There will **no** make-up exams, late assignments will have 10% of their final score deducted per day.

This class is primarily a programming class. As such, the expectation is that you should be more than comfortable with this. This course uses WebGL for assignments so you will be expected to have the ability to pick up the necessary HTML and Javascript skills needed, which are modest and won't hurt you to learn. You will need to have access to a computer (and browser) that supports WebGL as well.

There will be four assignments (worth 300 points), a mid-term (worth 100 points), a class project (worth 400 points) and a final exam (worth 200 points). This equals a total of 1000 points. Each assignment will have extra credit points available. The exams will be open book but not open laptop/phone/etc. The exams will be concept based. The final project is the main component of the class and you will be required to form teams of at least three (3) members (due to the large size of the class). You can have teams of up to five (5). Mixing graduate and undergraduate students on a project team will require professor Friedman's approval. Think carefully about your team and the complexity of the project you propose, as you will all share the same score for the project. We will provide ideas later on but you can certainly suggest whatever you like. You will be asked to submit a project proposal outline and the members of your team the week before the mid-term. The final week of class will consist of demos of each of your projects. The top three will be awarded bonus points based on class voting. The project demos are usually quite fun.

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Lecture 1 – 10/2
    Welcome, Course Administration and Questions
    Background, History and Overview of Computer Graphics
    Assignment #1 – Due 10/15

Lecture 2 – 10/7
    Reading Preparation – ICG Chapter 2 and 3
    Basic Setup for WebGL
    Fixed Function and Shader pipeline for graphics
    User and System Event Handling
    Viewports, Points and Coordinate Systems

Lecture 3 – 10/4
    Reading Preparation – ICG Chapter 4
    Transformations

Lecture 4 – 10/16
    Reading Preparation – ICG Chapter 5.1-5.7
    Quick Review
    Viewing and Projection / Types of, Matrices
    Clip Planes, Z-Buffer, Culling
    Shadows - Basic
    The "Camera" and its Control
    Assignment #2 – Due 10/29

Assignment #1 Due –10/17 by 11:55pm

Lecture 4 cont. – 10/21
    Reading Preparation – ICG Chapter 6.1-6.5
    Lighting Models
    Types of Light in Computer Graphics
    Normal Vectors
    Polygonal Shading

Lecture 5 – 10/23
    Reading – ICG Chapter 6.6-6.12
    More Lighting
    Fragment Lighting

Assignment #2 Due - 10/29 by midnight

Lecture 6 – 10/28
    Reading – ICG Chapter 7.1-7.5
    Texture Mapping
    Assignment #3 – Due 11/10

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Lecture 7 – 10/30
  Reading – ICG Chapter 7.6-7.13
  More Texture Mapping
  Environment, Reflection and Bump Mapping
  Compositing

Lecture 8 – 11/4
  Reading – ICG Chapter 9
  Scene Hierarchies and Graphs
  Project Team Proposals Due by 11:55pm
  Assignment #4 – Due 11/21

Mid-Term (optional) – 11/6

Assignment #3 Due – 11/10 by 11:55pm

Veteran's Day - NO CLASS – 11/11

Lecture 9 – 11/13
  Reading – ICG Chapter 7.14, 10.5
  Collision Detection
  Picking

Lecture 10 – 11/18
  Reading – ICG Chapter 12.8, 12.11-12.16
  Volume Rendering
  Parallel Rendering

Lecture 11 – 11/20
  Reading – ICG Chapter 5.10-5.11
  Shadow Techniques

Assignment #4 Due – 11/21 by 11:55pm

Lecture 12 – 11/25
  Reading – ICG Chapter 12.1-12.7
  Guest lecture on Ray Tracing, Path Tracing and associated Acceleration Structures
  Guest lecture on Physical Simulation and Modeling

Thanksgiving – NO CLASS – 11/27

Lecture 14 – 12/2
  Reading – ICG Chapter 11
  Curves and Surfaces

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Lecture 15 – 12/4

Reading – ICG Chapter 8
Mobile and Web Graphics, OpenGL ES

Term Projects DUE – 12/8 by midnight

Demo Day #1 – 12/9
        Project Demos

Demo Day #2 – 12/11
        Project Demos

Demo Day #3 – 12/12 (Discussion Section)
        If needed or Final Exam Review

Final Exam (optional) – Monday 12/15, 3:00-6:00 pm, Royce 190

There are many, many online references you can find to help you!

The Official WebGL Reference can be found online at:
https://www.khronos.org/webgl/

Author's Website (for errata and code and utilities):
http://www.cs.unm.edu/~angel/BOOK/INTERACTIVE_COMPUTER_GRAPHICS/SEVENTH_EDITION/