CS432 – Interactive Computer Graphics
Summer 2025

Description:
This is a projects-oriented class that introduces the concepts of interactive computer graphics. Students will learn the details of the WebGL graphics system by implementing weekly(ish) programming assignments.

Instructor:
Dr. Sean Grimes
spg63@drexel.edu

Office Hours:
Mondays 5pm – 6pm (Rm 1161)
Tuesdays 11:30am – 12:30pm (Zoom) --
We also have a course Discord channel, use it. If you want me to see it quickly, use @.

Teaching Assistant
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Class Time:
Mondays / Wednesdays 1:30pm – 2:50pm, 3675 Market, Rm 1103

Prerequisites:
CS260, MATH201 or MATH 261 or ENGR231

Recommended Textbooks:
Interactive Computer Graphics, 8th Edition, Edward Angel and Dave Shreiner, Pearson, 2020
Paper ISBN-13: 978-0-13-525826-2
Electronic ISBN-13: 978-0-13-521722-1

WebGL Programming Guide: Interactive 3D Graphics Programming with WebGL, 1st Edition, Kouichi Matsuda and Rodger Lea, Addison-Wesley, 2013
ISBN-13: 978-0321902924

OpenGL Shading Language, 3rd Edition, Randi Rost, et al., Pearson Education, Inc., 2010
ISBN-13: 978-0321637635

Software:

1. Modern web browser
    a. **I don't care where you do your development, but you must test your work on Firefox (latest stable version, don't get on the nightly nonsense). Your work will be graded on Firefox. "It works on Chrome!" is not something I want to hear. Chrome does their own thing with following standards, sometimes for the better, sometimes not. Either way, we're following standards.**
2. Python
3. Discord

Grading:

Programming assignments: 100%
The lowest assignment grade will be dropped.
No exams or quizzes (probably) – we'll discuss.

Late Policy:

Given previous experiences teaching this class, students tend to have different levels of readiness, especially with background in programming. I will adjust deadlines for the whole class as necessary, based on my observation of student effort and questions being asked over Discord, and attending office hours (mine or the TAs). One off deadline extensions are not possible, but I do realize that things come up from time to time. If you go into grade center, you will notice that you have a bank of 5 late days to use over the term. Late submissions will be accepted without penalty by deducting from your late day bank. Once you exhaust your bank, late assignments will take a 25% penalty on day 1, a 50% penalty on day 2, and will not be accepted on day 3+. I am also going to make all assignments due at 8AM – just assume that the deadline was really midnight the day before, and I am giving you an 8-hour grace period. Day 1 of late starts at 8:00:01 AM on the deadline. **Unused late days will be applied as extra credit points to the homework portion of your final grade.**

Grading Scale:

A+: Exceptional
A: 92.5-100
A-: 89.5-92.49
B+: 86.5-89.49
…. and so on.

Assignments:

1. All programming assignments must use the shader-based functionality of WebGL 2.0+ and GL ES 3.0+.
2. You may not use 3rd party libraries to complete your assignments.
3. Each web page that includes user interaction must contain text that explains what it does and how to use the interface.
4. **Submission requirements**
    a. All assignments must be submitted through Blackboard, do **not** send me submissions through email or Discord.
    b. The main file to be viewed / executed must be called index.html.

    c. So that we're all on the same page, all work will be graded on the latest stable release of Firefox. We may run into one or two issues with Windows vs macOS vs Linux, if this happens we'll find a solution.
5. You must work on assignments **individually**. Default policy for academic honesty violations is an 'F' for the course and an Academic Integrity report filed with the university. All submissions will be run through a plagiarism detection system, compared with students currently taking the class as well as previous students.
    a. Use of code from the lectures and textbook is fine, cite the source in a comment.
    b. Using Discord to discuss approaches, **without** discussing specific of the code, is fine.
    c. You cannot 'borrow' or be 'inspired by' work that is not your own.
    d. You may not pay another person to complete your assignments.
    e. You may not use ChatGPT or other generative AI to complete your assignments.
    f. Etc… The full University policy is here: http://www.drexel.edu/provost/policies/academic_dishonesty.asp

Assignments will be available on Blackboard under the assignments link on the left. All assignments are due the Sunday after they're assigned, 11:59pm.

Due dates:

1. Getting Started: June 29th, 11:59pm
2. 2D Graphics Programming: July 7th, 11:59pm
3. Interaction: July 14th, 11:59pm
4. 3D Transformations and Geometry: July 24th, 11:59pm
5. Viewing, Projection, and Flat-Shading: July 31st, 11:59pm
6. Lighting, Materials, Gouraud and Phong Shading: August 7th, 11:59pm
7. Bezier Patch: August 14th, 11:59pm
8. Texture Mapping: August 21st, 11:59pm
9. Picking: August 28th, 11:59pm
10. Extra Credit (two options): **August 31st, 11:59pm [no late submissions allowed]**

Other University Policies:

1. Students with Disability Statement: http://drexel.edu/oed/disabilityResources/students/
2. Course Drop Policy: http://drexel.edu/provost/policies/course-add-drop/
3. Course Withdrawal Policy: http://drexel.edu/provost/policies/course-withdrawal/
4. The instructor may change any part of the course before or during the term, including assignments, grade breakdown, due dates, and schedule. Such changes will be communicated to students via the course website (Blackboard). Please check it regularly.
5. Students requesting accommodations (http://drexel.edu/oed/disabilityResources/students/) due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) before accommodations can be made. These requests are received by the Disability Resources, who then issue the AVL to the appropriate contacts. For more information, please see: http://drexel.edu/oed/disabilityResources/overview/ or contact Disability Resources at disability@drexel.edu or (215) 895-1401.

Schedule (subject to change and deviation)

Week 1:

1. Class logistics, introduction to computer graphics, 2D programming in WebGL
2. Read: Angel & Shreiner Chapter 1, Sections 2.1-2.7, 12.1-12.7
3. Read: Matsuda & Lea Chapter 1, Pages 9-40
4. Programming Assignment: Getting Started

Week 2:

1. WebGL Shaders
2. Read: Angel & Shreiner Sections 2.8-2.10, 4.1, appendices A, B, & C
3. Read: Matsuda & Lea Pages 41-49, 58-91, 137-150, Chapter 6, Pages 344-355
4. Programming Assignment: 2D Graphics Programming

Week 3:

1. Interaction, Windows, Menus and Animation; Geometry and its Representation
2. Read: Angel & Shreiner Sections 3.1-3.8, 3.10, 3.11, 4.2-4.5
3. Read: Matsuda & Lea Pages 50-57, 124-135
4. Programming Assignment: Interaction

Week 4:

1. Transformations and 3D Programming in WebGL; Classical Viewing
2. Read: Angel & Shreiner Sections 4.6-4.14, 5.1
3. Read: Matsuda & Lea Pages 91-123, 267-287
4. Programming Assignment: 3D Transformations and Geometry

Week 5:

1. Viewing; Lighting, Materials, and Shading
2. Read: Angel & Shreiner Sections 5.2-5.8, Chapter 6
3. Read: Matsuda & Lea Pages 151 – 159, 225-266, 414-429, Chpter 8
4. Programming Assignment: Viewing, Projection, and Flat-Shading

Week 6:

1. Curves and Surfaces
2. Read: Angel & Shreiner Chapter 11
3. https://www.youtube.com/watch?v=aVwxzDHniEw (The Beauty of Bezier Curves)
4. https://www.youtube.com/watch?v=jvPPXbo87ds (The Continuity of Splies)
5. Programming Assignment: Lighting, Materials, Gouraud and Phong Shading

Week 7:

1. Texture Mapping
2. Read: Angel & Shreiner Chapter 7, Section 10.11
3. Read: Matsuda & Lea Pages 160-188
4. Programming Assignment: Bezier Patch

Week 8:

1. Buffers
2. Read: Angel & Shriner Chapter 8, Sections 3.9, 12.6, 12.8
3. Read: Matsuda & Lea Pages 360-367, 372-376, 380-404
4. Programming Assignment: Texture Mapping

Week 9:

1. Modeling and Hierarchy
2. Read: Angel & Shreiner Chapter 9
3. Read: Matsuda & Lea Chapter 9
4. Programming Assignment: Picking

Week 10:

1. Procedural Methods
2. Read: Angel & Shreiner Chapter 10
3. Programming Assignment: Extra Credit - Modeling Hierarchy