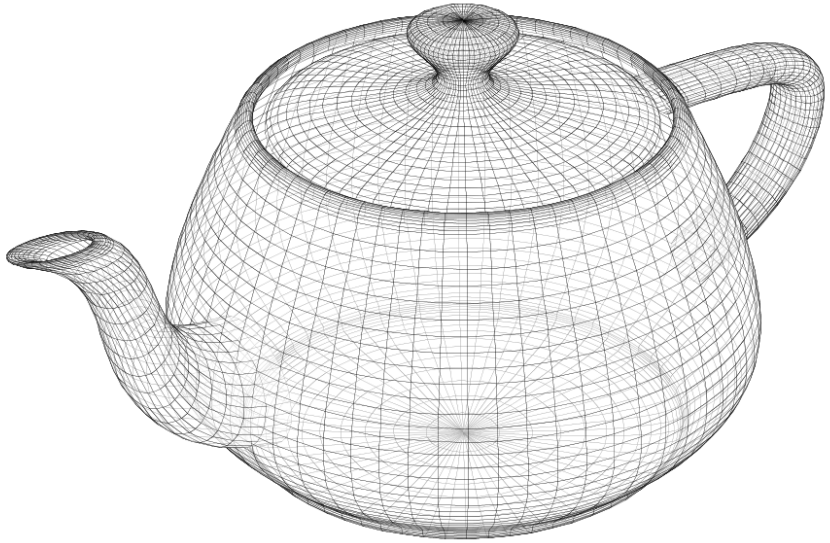
Course Mechanics



CS 418: Interactive Computer Graphics

Professor Eric Shaffer

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CS 418…About the Course

- **Interactive** Computer Graphics
- Focus on algorithms and techniques used in **rasterization**
  - Rasterization is fast enough for real-time complex 3D rendering
- The course will teach you how to use WebGL
  - Web-based rasterization engine
  - Similar features to many other technologies (e.g. OpenGL, Vulkan, D3D)
- We will also cover fundamental graphics algorithms
  - Things like line drawing that reside inside the WebGL library

Things you would not use WebGL for..

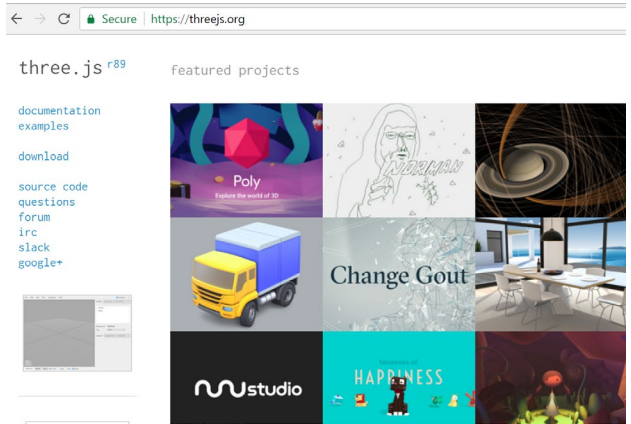
- **Making a Game**
  - Typically would use a game engine like Unity or Unreal

- **Making a Movie**
  - Renderman

- **3D Web App Development**
  - three.js which is built on WebGL

But to use three.js you need to understand WebGL

And, basic CG concepts need to be understood to use Unity or Renderman as well…



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So Why Use WebGL?

- Course goal: understand how graphics works at a fundamental level
  - …it's not limited to training on application dev in Unity, for example
- The fundamemtal concepts remain at higher levels

Unity dev interface

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Class Mechanics

- Course Website: https://courses.engr.illinois.edu/cs418
  - Schedule, lecture materials, assignments
- Piazza: This term we will be using Piazza for class discussions https://piazza.com/illinois/fall2020/cs418/home.
- Grades available on Compass
- MP submission on Compass

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Lectures

Lectures https://illinois-cs418.github.io/schedule

- **You can attend live lectures at 9am Central Time on Wednesdays at this Zoom link.** We will focus on actively working through problems and doing code walkthroughs. These lectures will be recorded and available on the course schedule.
- Additional lectures will be available as asynchronous video links posted on the course schedule.

You can expect new lectures to be posted by the end of the day on Monday, Wednesday, and Friday.

We know attending online synchronous lectures can be difficult, so there is no required attendance. If you can attend the Wednesday lecture, please do so.

Course Schedule

Date	Title	Materials
Aug 24	Welcome to the Course! Color and Digital Display Devices - Video Rendering - Video Rasterization - Video	Color and Digital Display Devices PDF Rendering PDF Rasterization PDF

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Things we aren’t doing….

- No Final Exam

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Things we are doing

	3 credits	4 credits
MP 1	10%	5%
MP 2	10%	10%
MP 3	10%	10%
MP 4	10%	5%
Weekly Quizzes	15%	15%
Exam Grade	45%	45%
4 Credit Project		10%

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Exams

Exams

This class will have three midterm exams and no final exam. Each exam is on the PrairieLearn platform.

- Exam 1: 9am-10am, Sept. 30, 2020
- Exam 2: 9am-10am, Nov. 4, 2020
- Exam 3: 9am-10am, Dec. 9, 2020

The exams will be online using Prairielearn. **They will be synchronous and available from 9am-10am Central Time on the day of the exam** They are open web - you can use any reference material you wish while taking the exam. You should not collaborate with other people. Any instances of collaboration will be considered a violation of academic integrity and will result in a 0 on the exam and a letter grade reduction in the final course grade. Also, the nature of the exam will make collaboration unhelpful - you will get a better grade working on your own rather than wasting time trying to work together.

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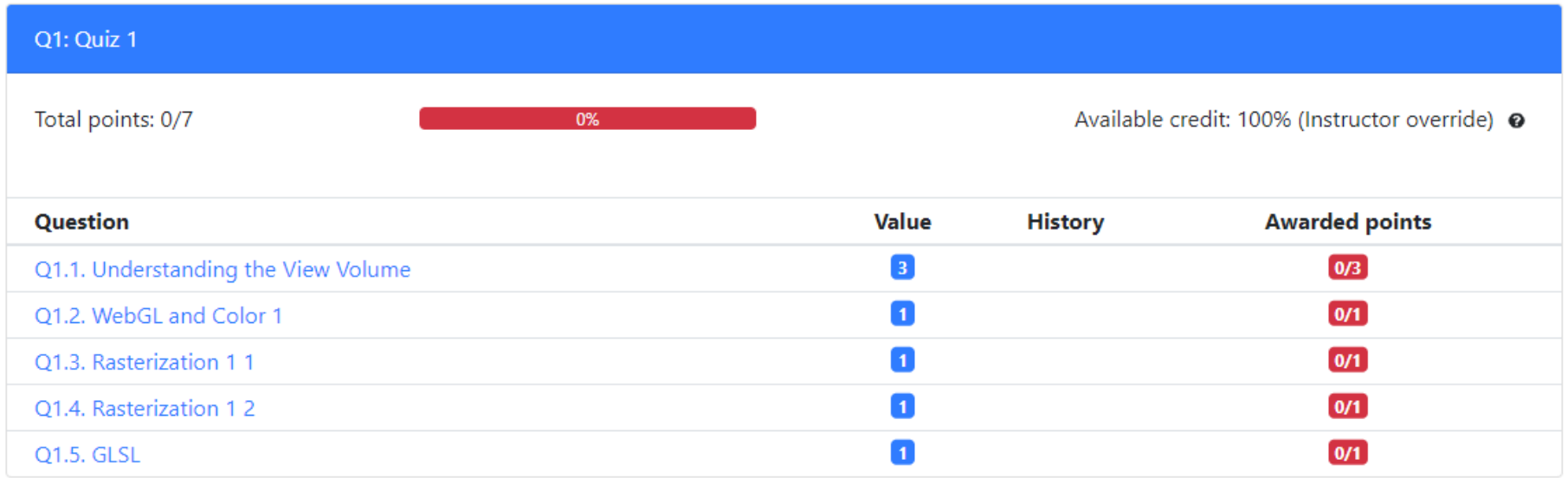
Quizzes

Weekly Quizes https://prairielearn.engr.illinois.edu/

There will be short weekly quizzes on PrairieLearn. These quizzes will be based on the lecture material and will serve as practice for the exams **Each quiz can be taken repeatedly..you can retake it till you get all the questions correct**

- **They are due by Friday at midnight of the following week (e.g. Quiz 1 is due by Friday of Week 2).**
- They can be completed late for 50% credit at any time before Dec. 9.



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Grading Scale

Percentage lower bound	Grade
98%	A+
93%	A
90%	A-
87%	B+
83%	B
80%	B-
77%	C+
73%	C
70%	C-
67%	D+
63%	D
60%	D-
0%	F

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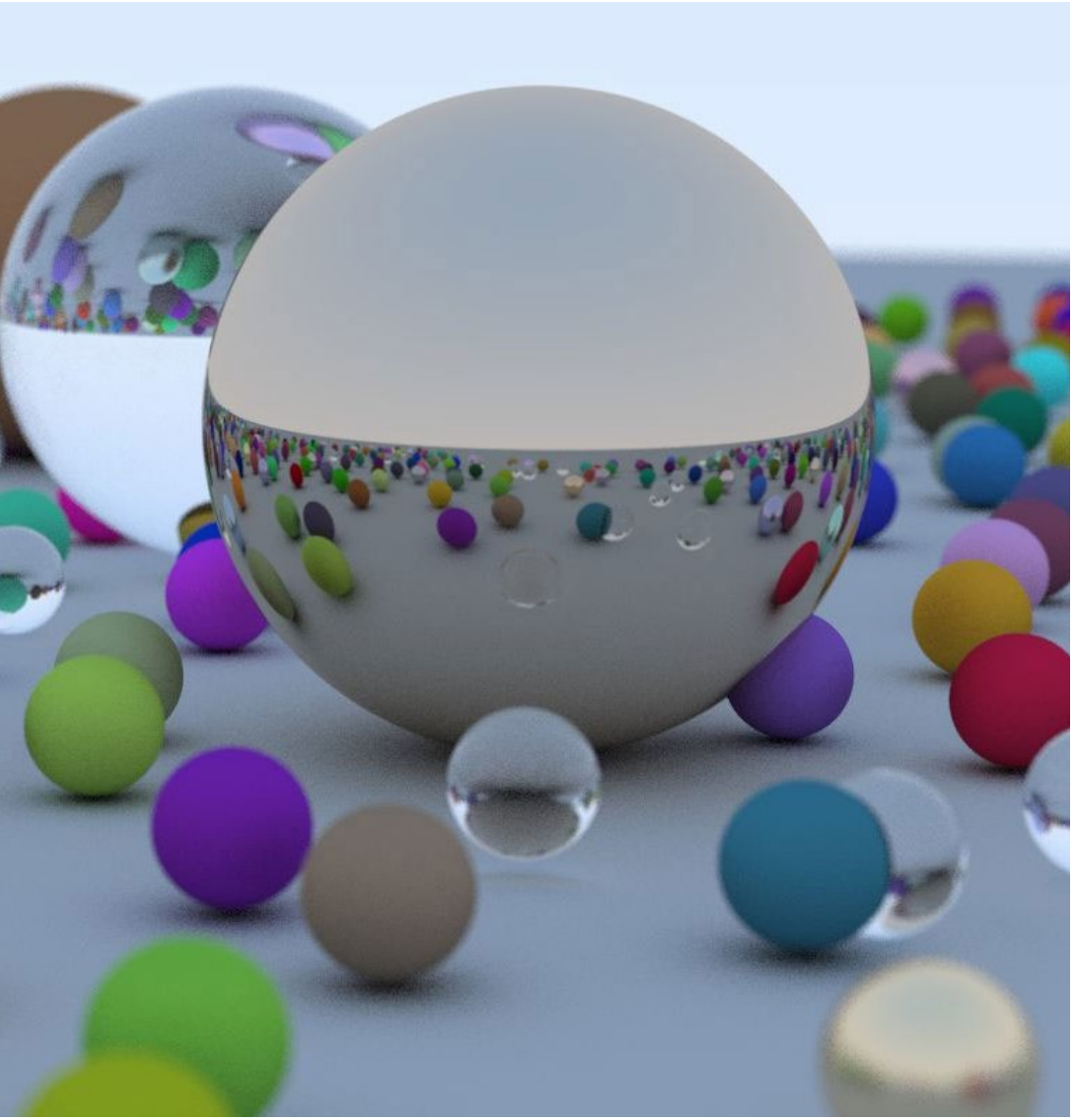
4 Credit Students



4 Credit MP: Ray Tracing

Due: **Dec. 9, 2020 @ 11:59 PM**

https://illinois-cs418.github.io/assignments/fourCreditMP.html

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Course Policies

https://illinois-cs418.github.io/assignments

Late Work

Machine problems submitted after the due date lose 10% of the total assignment value per day. In exceptional circumstances where extension may be reasonable (illness, family emergency etc.) arrangement must be made with the instructor.

Collaboration

You should collaborate on the MPs during the design process...you absolutely can figure out how to implement things together. If you work on MPs together, document your collaborators in the author comment in your submitted code.

You should type the code in yourself. You should not copy code verbatim from each other or the web. You can reuse code from the course website. Each MP has a creative component and we expect that your MP will look noticeably different than other submissions. The penalty for egregious plagiarism will be a 0 on the assignment and loss of 1 full letter grade from the total course grade.

Regrade Requests

To submit a regrade request:

- Create a private Piazza post with the `regrade` tag.
- Include a brief explanation of why you think your grade is incorrect.
- You must submit regrade requests within one week after we release grades on a given assignment.

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Class Mechanics: No Book

Language References and Resources

- JavaScript/HTML/CSS:
  https://developer.mozilla.org/en-US/docs/Web/JavaScript
- WebGL Specification:
  https://www.khronos.org/webgl/
- WebGL Tutorial:
  https://developer.mozilla.org/en-US/docs/Web/API/WebGL_API
- Suggested Editors: Brackets
- Chrome DevTools Overview: https://developer.chrome.com/devtools

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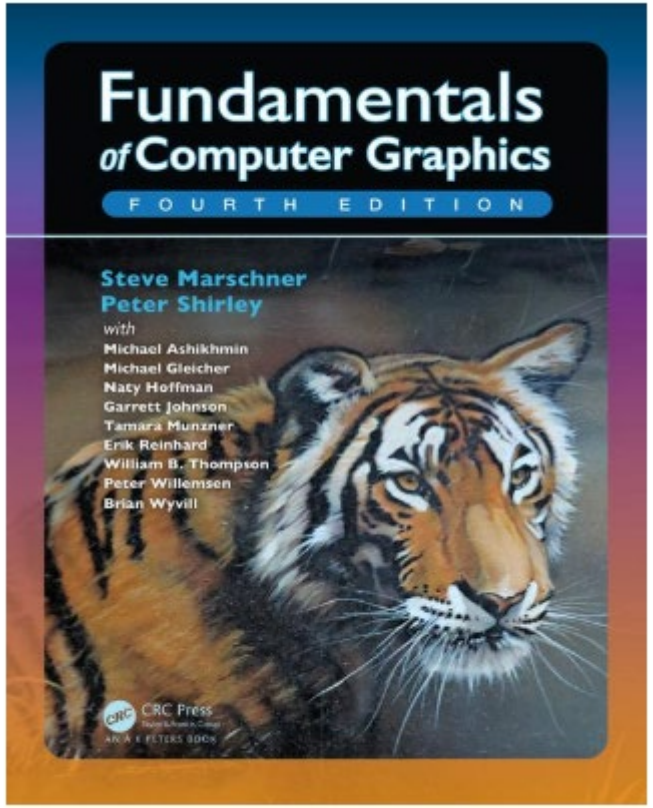
Suggested Books



Fundamentals of Computer Graphics 4th Edition by Steve Marschner, Peter Shirley

Deals with the theoretical and mathematical aspects of computer graphics. Very readable.

UIUC Library E-book link

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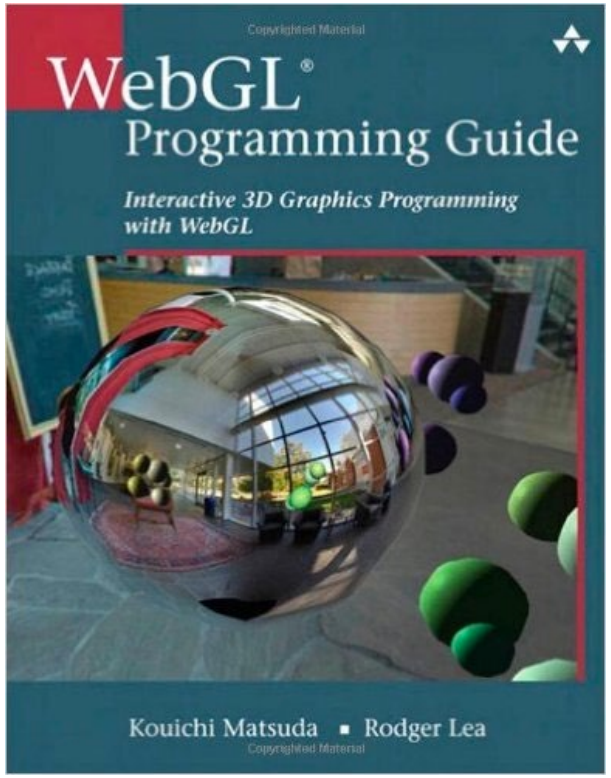
Suggested Books



WebGL Programming Guide: Interactive 3D Graphics Programming with WebGL (OpenGL)Jul 19, 2013
by Kouichi Matsuda and Rodger Lea

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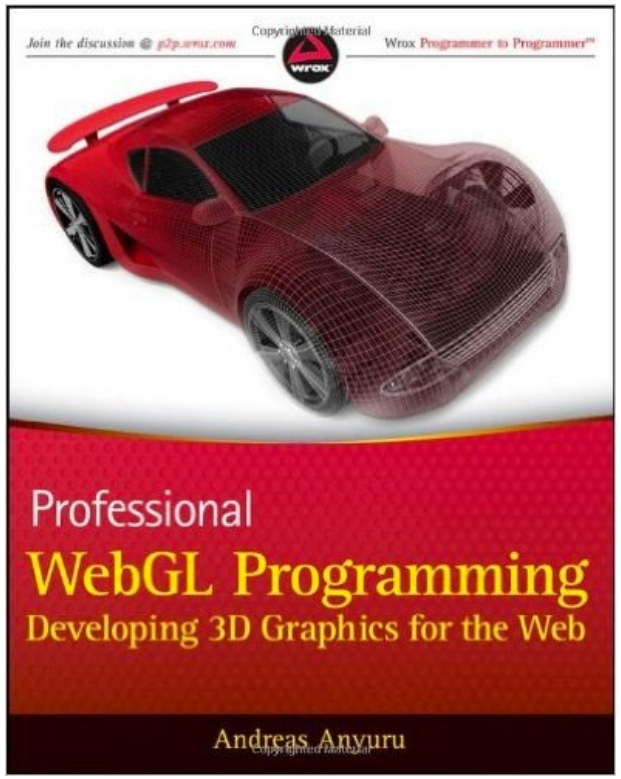
Suggested Books



Professional WebGL Programming: Developing 3D Graphics for the Web
May 8, 2012
by Andreas Anyuru

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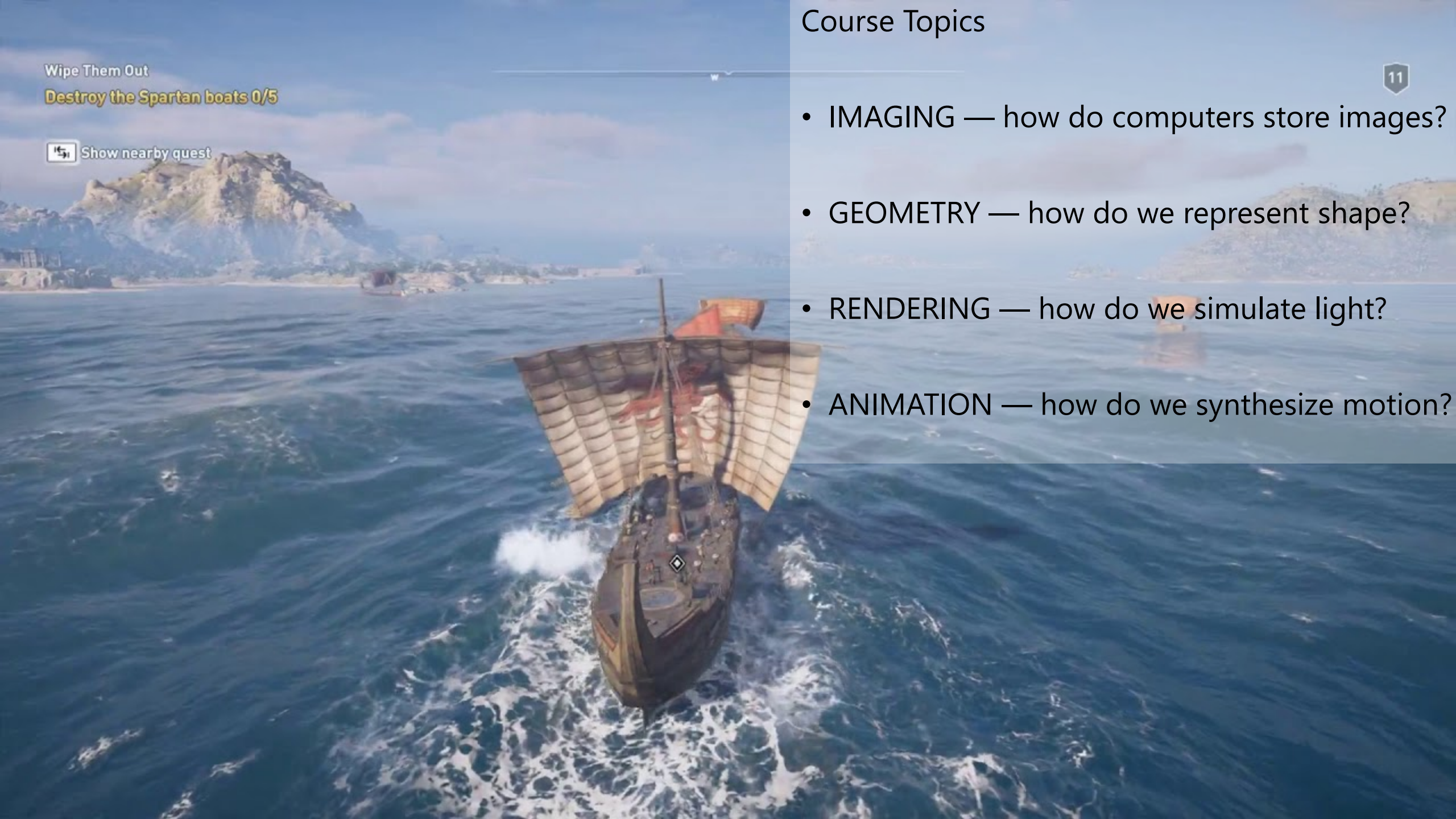


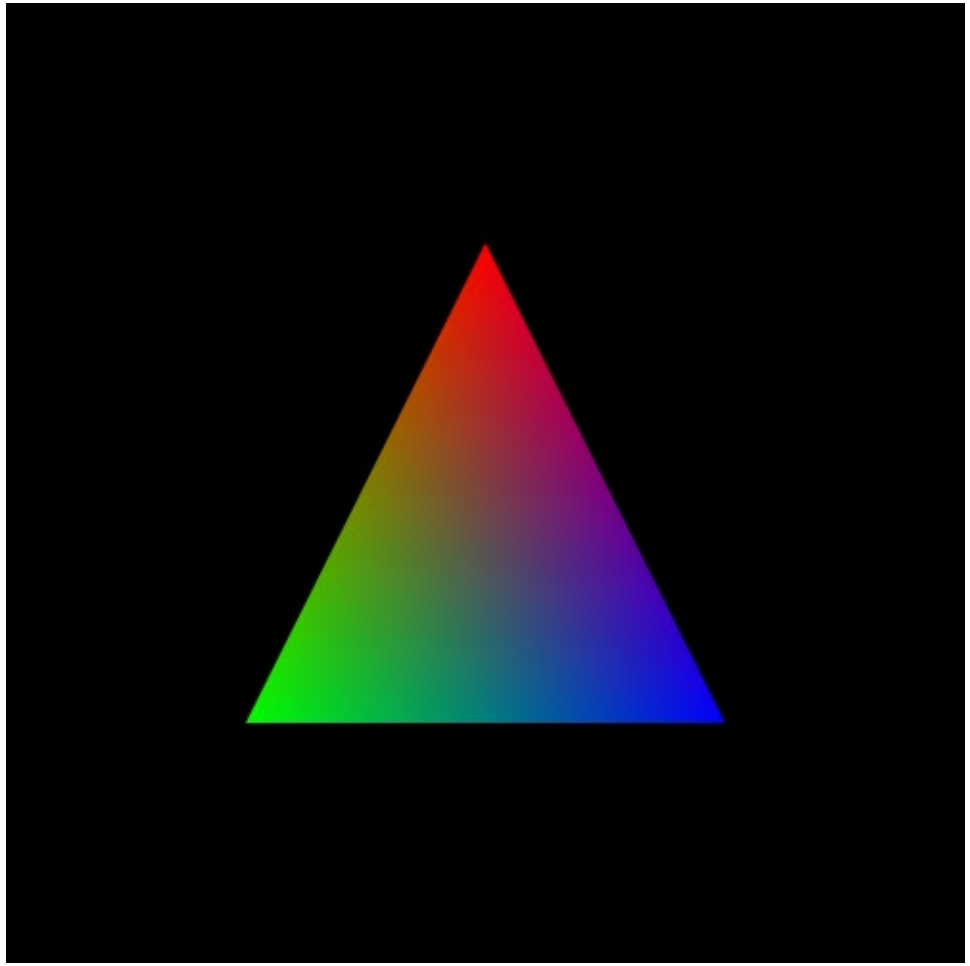
Course Topics

- IMAGING — how do computers store images?
- GEOMETRY — how do we represent shape?
- RENDERING — how do we simulate light?
- ANIMATION — how do we synthesize motion?

Some WebGL

- https://artsexperiments.withgoogle.com/bagan
- https://paveldogreat.github.io/WebGL-Fluid-Simulation/
- http://david.li/fluid/

We will start with



For Next Class

- If you have a laptop or your own PC
  - Install an editor (e.g. Brackets)
  - Install a browser supporting WebGL (e.g. Chrome)
  - Verify WebGL runs in that browser on your machine

    https://illinois-cs418.github.io/Examples/HelloColor.html
    https://illinois-cs418.github.io/Examples/HelloColor.js

  Try changing the code…different color…different shape

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