

# CSC 433/533

## Computer Graphics

Alon Efrat  
[alon@cs.arizona.edu](mailto:alon@cs.arizona.edu)

Credit for much of the material  
Joshua Levine

## Lecture 01

### Introduction

## Course Material Source Credits

- Joshua Levine
- Steve Marschner
- Justin Solomon
- Wojciech Matusik
- Adam Bargteil
- Many others...

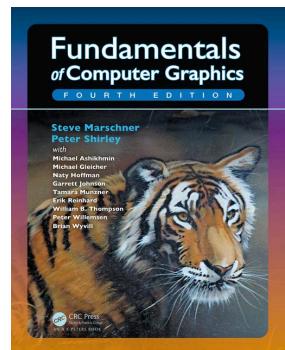
## Today's Agenda

- Registration Issues? See me after class.
- Course webpage: [here](#).
- Go over syllabus and introduce the course

## Course Syllabus

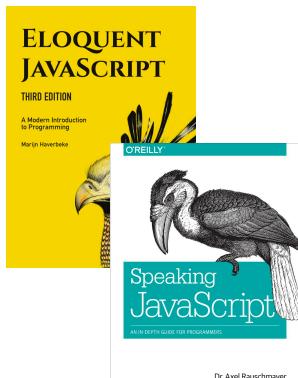
## Required Course Materials

- Fundamentals of Computer Graphics, 4th Edition by Marschner and Shirley
- ISBN 978-1482229394
- Book is available electronically through the library (but purchasing is recommended!)
- A number of other materials distributed through the webpage



## Required Course Materials

- If you do not know Javascript, you will need a reference!
- Two electronic references:
  - <https://eloquentjavascript.net/>
  - <http://speakingjs.com/>



## Course Grading

1. Assignments (6 total): 58%. Lowest one is dropped.
  - Includes both a written (13%) and programming (45%) component
  - A late penalty of 5% per day will apply.
2. Midterm Exam: 14%
3. Final Exam: 18%
4. Max(Midterm,Final): 10%

## Prerequisites

- Programming skills are necessary! We will develop assignments in Javascript
- Linear algebra is essential, but we will review many of the concepts throughout.
- Previous experience in HCI, graphics, or visualization very useful, but not required.

## Course Policies

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Do:</li></ul>  | <ul style="list-style-type: none"><li>• Don't:</li></ul>   |
| <ul style="list-style-type: none"><li>• Come to class prepared and ready to participate</li><li>• Write clean, correct, documented, and tested code</li><li>• Contact me if you have any special needs</li><li>• Be considerate of others and respectful of them and their time.</li><li>• Discuss problems with classmates before coding.</li></ul> | <ul style="list-style-type: none"><li>• Steal code, share answers (from both others in the class and outside of it)</li><li>• Steal copyrighted materials</li><li>• Be dishonest</li><li>• Criticize people. Instead, critique ideas</li><li>• Violate department/university policies (academic integrity, title IX, etc.)</li></ul> |

## Administrative Updates

- UA CS Health room
- CAPS: Counseling & Psych Services:  
<https://health.arizona.edu/>
- Reminder from Academic Services:  
Be respectful of your TA!



## Coding Policies

- Unless otherwise noted, you **must write your own code**. Collaborating with or sharing code with other people in this course is plagiarism and if caught will be reported to academic dishonesty.
- You are allowed to **discuss** assignments with other students at the **conceptual** level.
- You must **cite sources** for code snippets or ideas taken from **external sources**.
- OK to: get ideas from the book, from the web
- NOT OK to: share or distribute code, use ideas without attribution.

# Computer Graphics

What is it? Why do we study it? Who does it?

## CG Areas

- Imaging: Representing and manipulating 2D images
- Modeling: Specifying and Storing 3D objects
- Rendering: Creating 2D images from 3D
- Animation: Creating the illusion of motion through sequences of images.

## Computer Graphics Past, Present, and Future

70s-80s (1982)

NYIT's Experimental Computer Graphics Extravaganza  
**PROJECTS:** Inside "The Works"

by Suzan D. Prince



[https://en.wikipedia.org/wiki/The\\_Works\\_\(film\)](https://en.wikipedia.org/wiki/The_Works_(film))  
[https://youtu.be/g\\_q38qWv1fo](https://youtu.be/g_q38qWv1fo)

PIXAR

FEATURE FILMS SHORT FILMS TECHNOLOGY CA

90s (1997)

GERI'S GAME

T36  
MEDIA

HOME PORTFOLIO ABOUT CONTACT BLOG

2012

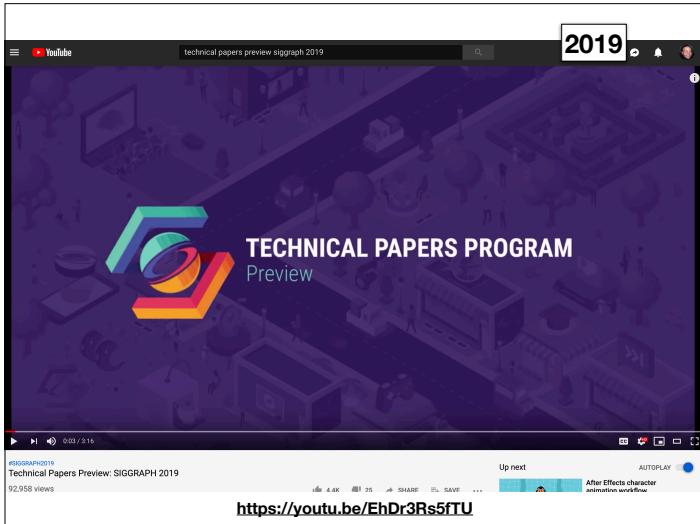
5.80 METRES ANIMATION

06 / 04 / 2013



The film 5.80 metres by Nic Lormée was made for Orange in Paris and the studio <https://www.dailymotion.com/video/x3is84c> Productions & and more until finally no one can define the origin of an image. And of course, in the film they sound so different... It received a 70%

<https://www.pixar.com/geris-game>  
<https://youtu.be/9IYRC7g2ICg>



## Many Applications of CG!

- Entertainment: Video Games, Cartoons, Films
- CAD/CAM/CAE: Computer-aided design/modeling/engineering
- Visualization
- Medical Imaging
- Education / Training / Simulation
- Art

## Course Expectations

What will you accomplish?

## Course Objectives

- Describe and apply the foundations of computer graphics, including hardware systems, mathematics for computer graphics, light, and color;
- Understand and write programs that implement key concepts from two-dimensional graphics, including raster image formats, image and signal processing, image deformation, and rasterization;
- Understand and write programs that implement key concepts for rendering complex three-dimensional scenes, including projections and view transformations, visibility algorithms, ray tracing, scene descriptions, and spatial data structures;
- Become familiar with and implement partial prototypes for a variety of advanced topics in computer graphics; including texturing, animation, physically-based modeling, procedural modeling, curves and surfaces, global illumination, implicit modeling, and/or interaction; and
- Undertake creative work and be familiar with open computer graphics research problem areas.

## Course Grading

1. Assignments (6 total): 58%
  - Includes both a written and programming component
  - A late penalty of 5% per day will apply to programs. Maximum 7 days late.
2. Midterm Exam: 14%
3. Final Exam: 18%
4. Class Participation: 10%

## Assignments

- Six assignments expected (58% of total grade)
- We will use Javascript
- Submissions will be made using git and GitHub classroom (more details in the first assignment)
- While the majority of points (45%) will be devoted to the programming component of the assignment, but most assignments will also include a few written exercises.

## Exams

- Will cover all material taught prior to the exam, but more specs to come.
- Written portions of assignments will be good practices for the exams
- Midterm: Mon., Oct 21, 5:00-6:15pm
- Final: Wed., Dec 19, 1:00-3:00pm

## Class Participation

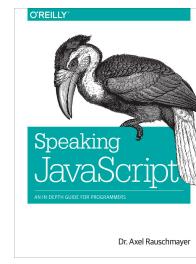
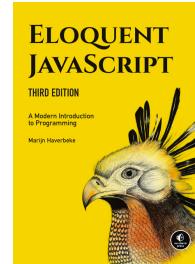
- Attendance is not mandatory, and will not be collected but...
- I expect you to make your best effort to attend, on time, **and** a participating member of the audience.
- Discussions during lecture will be frequent.
- Have your webcam will make the discussions more effective and enjoyable.
- Discussions on piazza will be encouraged.

## Lec01 Required Reading

- The course syllabus
- FOCG, Ch. 1

## Lec02 Required Reading

- See <https://jalevine.bitbucket.io/csc433-533/lectures/2019/08/28/L02.html> for links on learning Javascript



## Piazza

- Sign up immediately if you are not already enrolled!
- <https://piazza.com/configure-classes/fall2020/csc433533>