
Computer Graphics

1 - Course Intro

Yoonsang Lee
Hanyang University

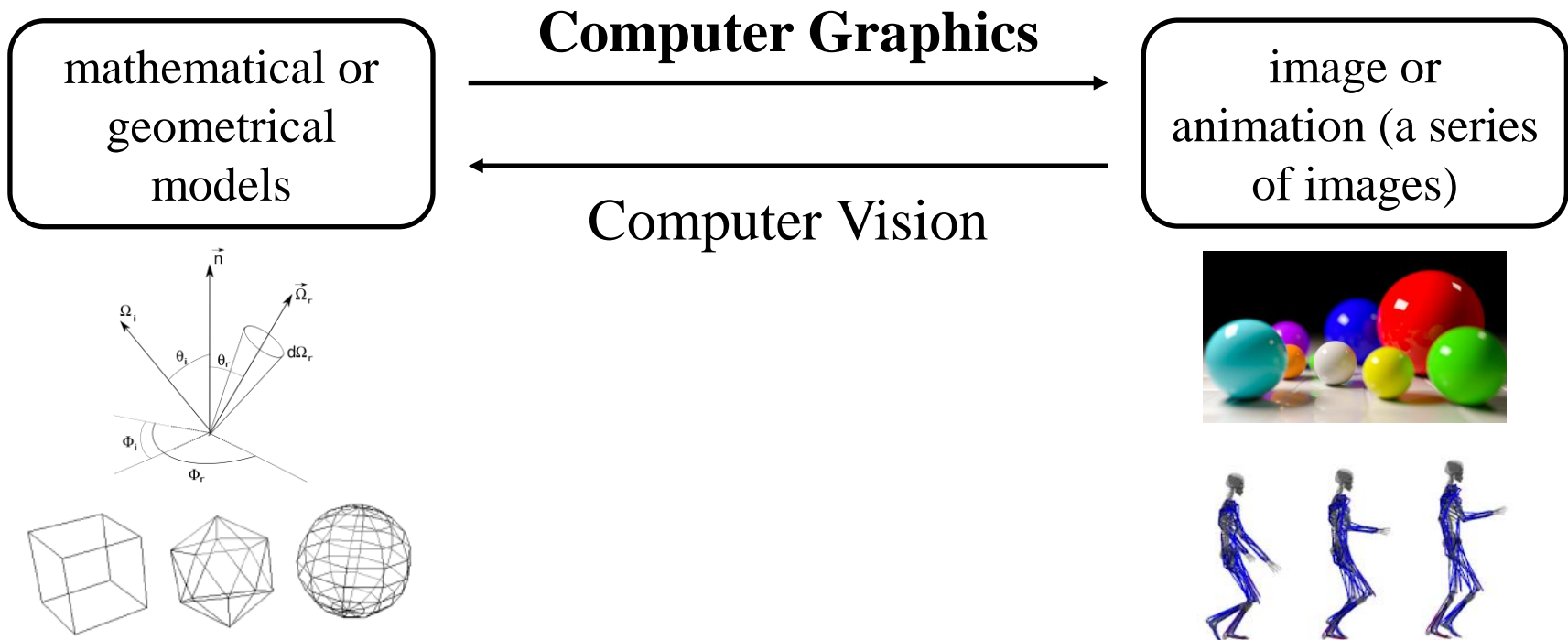
Spring 2023

Course Information

- Instructor: Yoonsang Lee (이윤상)
 - yoonsanglee@hanyang.ac.kr
- Teaching Assistant: Jiwon Yi (이지원)
 - babap8514@gmail.com
- Course Homepage
 - The LMS course homepage at portal.hanyang.ac.kr (or learning.hanyang.ac.kr)
 - Slides will be uploaded to Lecture Contents(강의콘텐츠), probably *just before the lecture*. So, please **download lecture slides at the beginning of each lecture.**

What is Computer Graphics?

- The study of creating, manipulating, and displaying visual content using computers.



Movies & Games

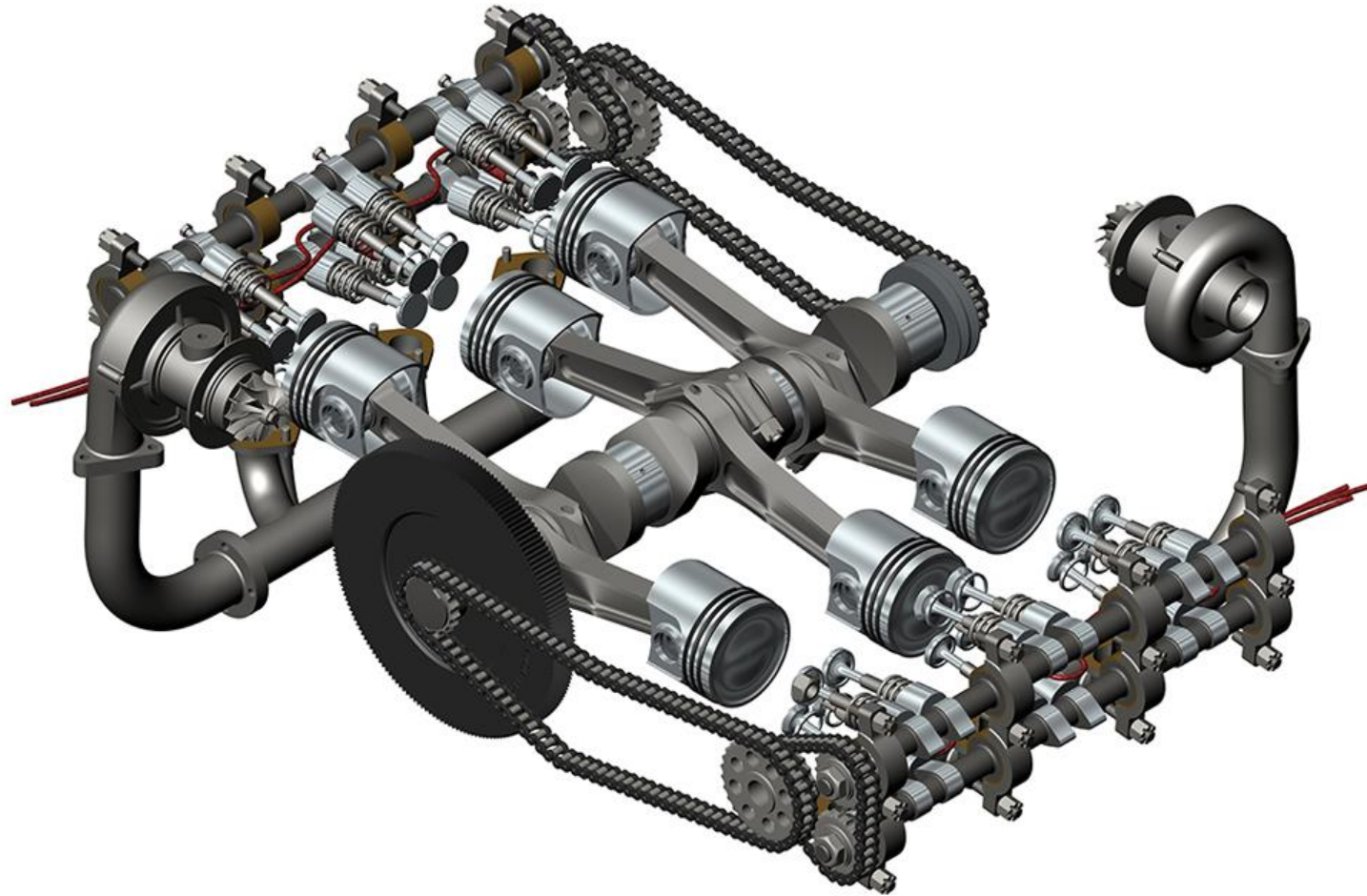


Encanto



Red Dead Redemption 2

Engineering



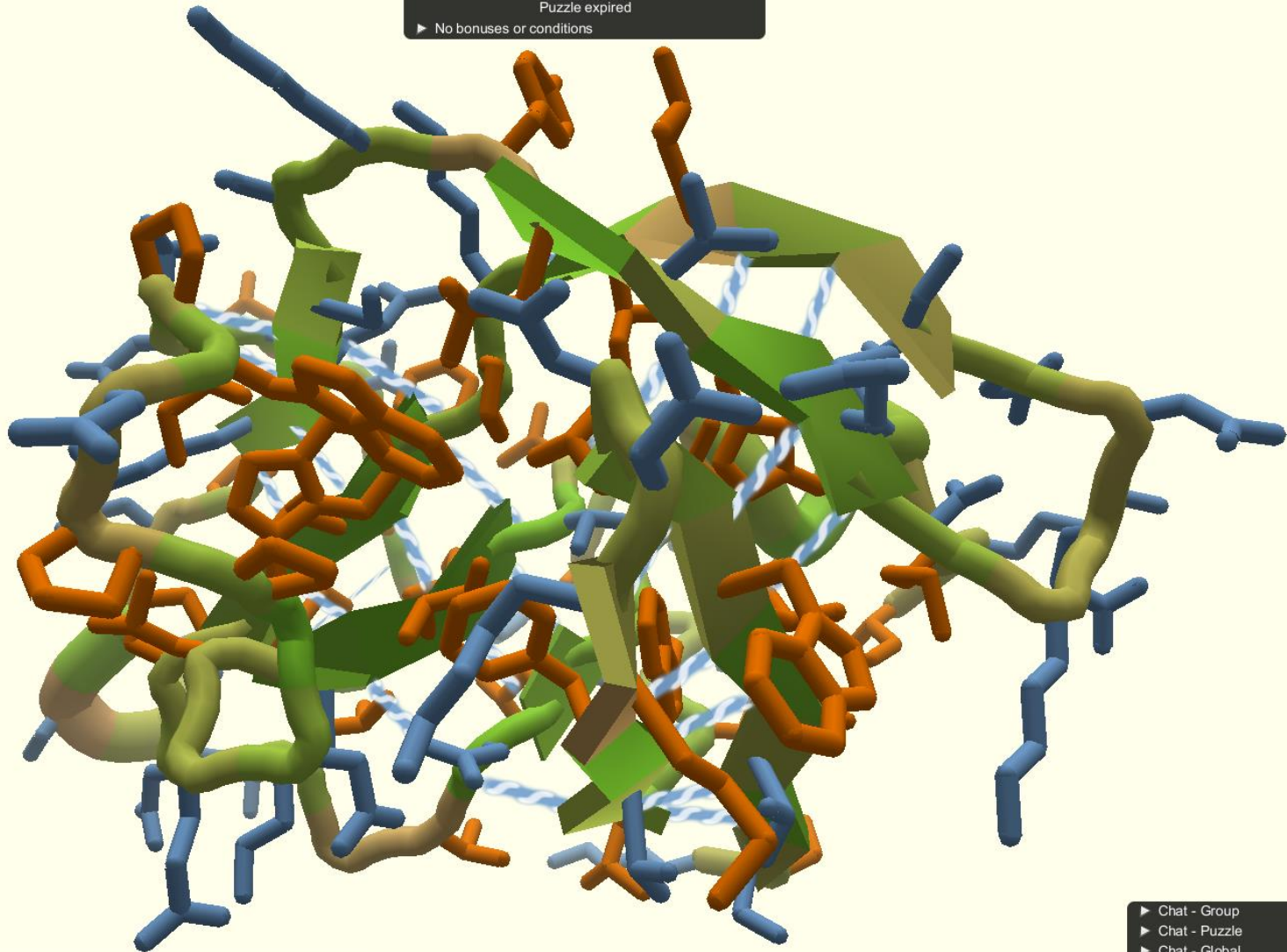
Solidworks

Natural Science

Foldit

Pull Mode

Rank: - Score: 10563.052
Soloist 460: Quest to the S...nkey Virus Protein
Puzzle expired
▶ No bonuses or conditions

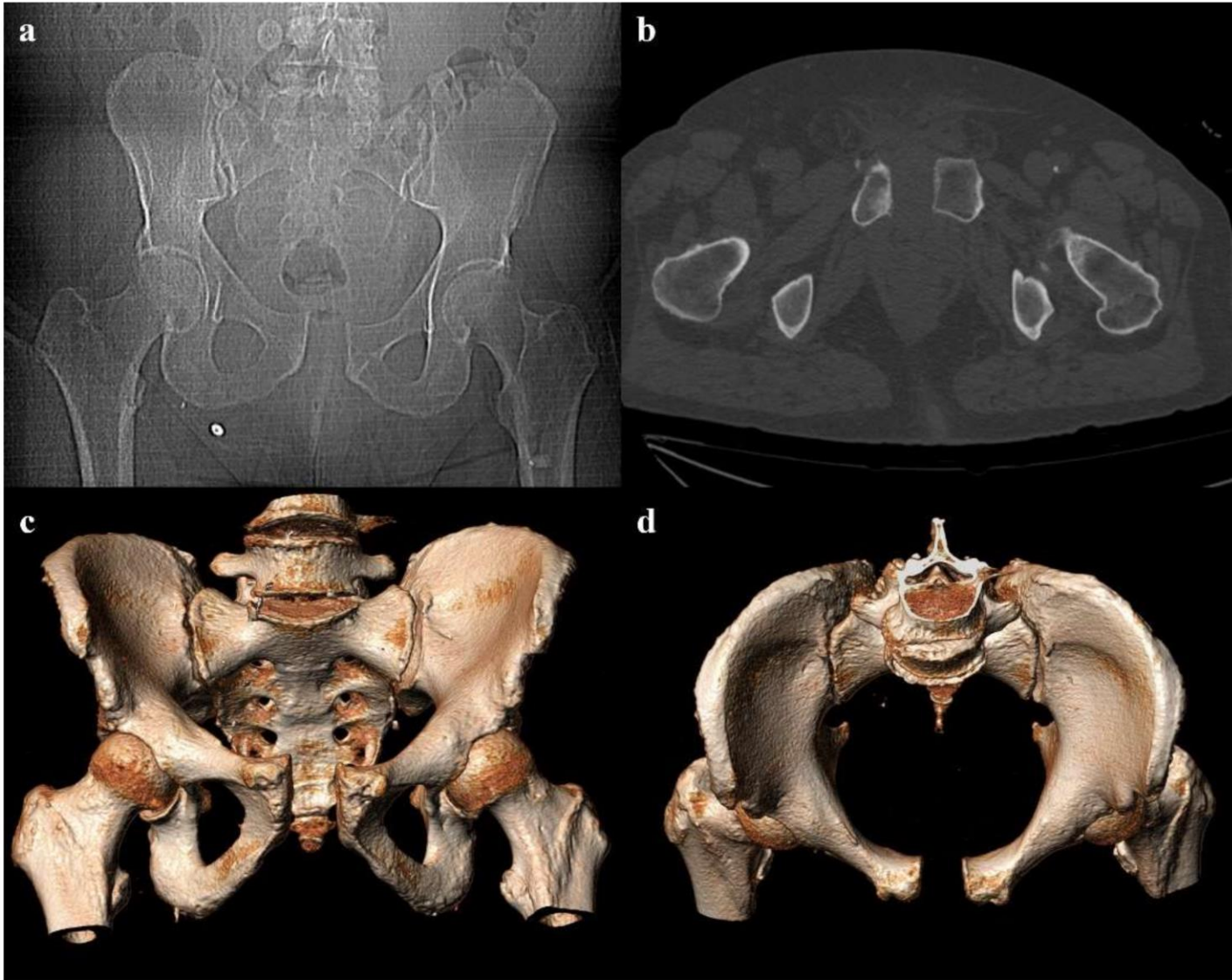


0000000000

▶ Actions ▶ Undo ▶ Social ▶ Modes ▶ Behavior ▶ View ▶ Menu

▶ Chat - Group auto show
▶ Chat - Puzzle auto show
▶ Chat - Global auto show
▶ Notifications auto show

Medical Science



CT images and volume rendering

Course Overview

- Computer Graphics: Mathematics made visible
- In this course, you will
 - Explore **fundamental computer graphics & mathematics concepts**
 - Learn how to use **modern OpenGL**
- You will **not**
 - Learn sophisticated computer graphics techniques
 - Learn or use **legacy OpenGL**

Course Overview

- As “implementation examples” of the fundamental computer graphics concepts, we’ll use:
- On-line WebGL demos (Lectures)
- Modern OpenGL API (Labs)
- Blender: An open-source 3D graphics tool (sometimes)
- These examples will help you understand the concepts more clearly.

Prerequisites

- Basic knowledge of linear algebra
 - Understanding of basic concepts and operations on vectors and matrices,
 - Such as matrix-matrix multiplication, matrix-vector multiplication, identity matrix, dot product, cross product, etc.
 - If you know these things, it is enough to take this course.
- Basic knowledge of programming skill
 - We'll use Python in this class.
- You don't need artistic sense!

Textbook

- **Textbook : Lecture slides**

Schedule (subject to change)

Week	Lecture	Mon
1	1 - Course Intro	3/6
2	2 - Rendering Basics	3/13
3	3 - Transformation	3/20
4	4 - Affine Space / Frame / Matrix	3/27
5	5 - Vertex Processing 1	4/3
6	6 - Vertex Processing 2	4/10
7	7 - Hierarchical Modeling, Mesh	4/17
8	8 - Lighting	4/24
9	Midterm Exam	5/1
10	9 - Orientation & Rotation	5/8
11	10 - Character Animation	5/15
12	11 - Curves	5/22
13	12 - More Lighting, Texture	5/29
14	13 - Rasterization & Visibility	6/5
15	Final Exam	6/12

Lectures & Labs

- Each pair of a lecture and a lab will be held on the same day.
- Lectures (by instructor)
 - Lectures for fundamental computer graphics concepts
 - Does not depend on specific libraries or software
- Labs
 - Lectures for modern OpenGL (by instructor)
 - Time to do your assignment (with support of TA)

Assignments

- One assignment per lab.
- A simple programming task.
 - The goal is to let you understand what you've just learned in lectures and labs every week.
 - You can ask TA questions about things you do not understand.
- How to submit:
 - No submission. Just raise your hand when you're done to get confirmation from TA. Then you can leave the classroom.
 - This confirmation is used to score the assignment, which is later used for grade calculation.

Projects

- Total three projects will be given.
 - Individual projects, not team projects.
- Much more challenging programming tasks.
- The due date will be two to three weeks after the project is given.
- How to submit:
 - Submit through the LMS course home

Policy for Projects

- **NO SCORE** for late submissions
 - Submit before the deadline!

- **NO SCORE** for copying
 - If A copies B's code, A and B will get 0 point.
 - If A, B, C copies the same code from the internet, they will all get 0 point.

Grading

Midterm exam	37.5%
Final exam	37.5%
Projects	15%
Assignments	5%
Quiz	3%
Attendance	2%

- You will get "F" for more than 5 absences in four-hour sessions of (lecture + lab)s.
 - 3 lates are regarded as 1 absence.
- Absences from the midterm or final exam → F

Grading Policy

- Basic principle: Separating the grades where there is a big gap between points.

- Guideline:

A	20%~25%
B	25%~35%
C	40%

- **The grades are calculated by combining the students of the two computer graphics courses I'm teaching this semester.**

[Important] Midterm & Final Exams

- The exams are held on the following date and time, and **students who are unable to take the exam at that time should not take this course.**
- Midterm: **May 1 (Mon) 7:00-9:00 PM**
- Final Exam: **June 12 (Mon) 7:00-9:00 PM**

Language

- I will mainly use English in classes.
- **But the most important goal is improving your understanding**, both for English and non-English speakers.
 - So, I'll **“paraphrase” the explanation in Korean for most slides.**
- In lab assignment time, TA will mainly use English when making announcements to all students.
 - But you can ask TA personally in Korean or English.
- Now, let's take a quick look at prev. slides in Korean.

Questions – Slido.com

- After lectures, if you have questions, ask on the "Q&A Board" ("문의게시판") of the LMS course home.
 - TA will check and respond at least once a day.
- In lectures, we'll use an online, anonymous Q&A platform – slido.com to encourage questions.

Just Try Asking a Question!

- Go to <https://www.slido.com/>
- Join #cg-ys
- You do not need to log in to slido.com.
- **Do not bookmark a slido event page** because new events will be created every week!

- Ask any questions in English!

Questions – Slido.com

- In slido.com, you can
 - **Ask** your own questions anonymously
 - **Upvote** other questions
- We'll use the slido Q&A **only during lecture & lab time taught by the instructor.**
 - Not after lecture or lab time
 - Not in the lab assignment time
 - No written answers
- Please ask questions **anonymously.**
 - Just leave your name blank when post a question.

Quiz – Slido.com

- Three quiz problems per each lecture (using slido.com polls)
- Very simple questions – you have to submit an answer in two minutes.

Quiz – Slido.com

- Your quiz score is based solely on whether or not your answers is submitted in the following format:
 - **Student ID: Your answer**
 - e.g. **2021123456: 4)**
- **Whether your answer is correct or not has nothing to do with your quiz score!**
- This year, attendance check has nothing to do with quiz submissions.

Just Try a Quiz!

- Go to <https://www.slido.com/>
- Join #cg-ys
- Click “Polls”

- Submit your answer in the following format:
 - **Student ID: Your answer**
 - e.g. **2021123456: 4)**

- Note that your quiz answer must be submitted **in the above format** to receive a quiz score!

About Laptop

- Bring your laptop to lectures and labs.
 - Lecture slides contains many WebGL demos, so you'll need a laptop to run them and listen to the lecture.
 - In labs, you will need to bring your own laptop for practice and assignments.
 - If you would like to rent a laptop, please contact the TA by email by the next week lab. However, it is recommended that you bring your own laptop, as they will be quite old.
- Ensure your laptop supports **OpenGL 3.3 or higher**.
 - We'll use **OpenGL 3.3 Core Profile**.

Checking OpenGL Version

- Windows, Mac: Use "OpenGL Extensions Viewer"
 - <https://support.esri.com/en/technical-article/000011375>

- Ubuntu: Use "glxinfo" (need to install mesa-utils)

```
sudo apt-get install mesa-utils  
glxinfo | grep version
```

- Find 'OpenGL core profile' version (we'll use the core profile).

- Reference: Supported APIs for Intel[®] Graphics
 - <https://www.intel.com/content/www/us/en/support/articles/000005524/graphics.html>
 - Intel CPUs with integrated graphics that do not support OpenGL 3.3 are quite old CPUs released in 2011.

Classroom Etiquette

- **DO NOT negatively affect other students** in the classroom. For example,
 - Doing other things with your laptop (e.g. playing games)
 - Looking at your phone for a long time
 - Private conversation
 - Sleeping on a desk

My Recommendation

- DO NOT recommend this class to those who...
 - want to easily earn a good grade.
 - expect lectures in fluent English.
- Recommend this class to those who...
 - wonder how movies/games render scenes.
 - are interested in the movement of objects/characters.
 - like to visualize something by coding.
 - have passion for computer graphics!

Lastly...

- If you agree on all these policies, see you next time!
- If not, you can leave the classroom now, and consider taking another class instead.

Lab Session

- This is not the end.
- Now, let's start our first lab.