Computer Graphics

1 - Course Intro

Yoonsang Lee
Spring 2022

Course Information

- Instructor: Yoonsang Lee (이윤상)
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- Course Hompage
  - 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, **download lecture slides at the beginning of each lecture.**
  - If you want to study the lecture slides **in advance**, please refer to last year's lecture slides (They won't change much): https://cgrhyu.github.io/courses/2021-spring-cg.html

Hybrid Lecture Policy

- This course consists of lectures and labs.

- **Lectures** will be given in the **"hybrid lectures"** using both offline lectures and the LMS "video meeting(화상강의)" feature at the same time.
  - If you want to attend an offline lecture, just come to the classroom on time.
  - Otherwise, just join the LMS lecture session (the video meeting). **Please turn on your camera in this case.**
  - There will be no difference in lecture content between offline lectures and online lecture sessions
    - because I will give lectures while connected to the LMS lecture session.

- **Labs** will be given in the **"live online lectures"** only using the LMS "video meeting(화상강의)" feature.
  - In order to prevent COVID-19 infection caused by TA moving between students for Q&A .

Hybrid Lecture Policy

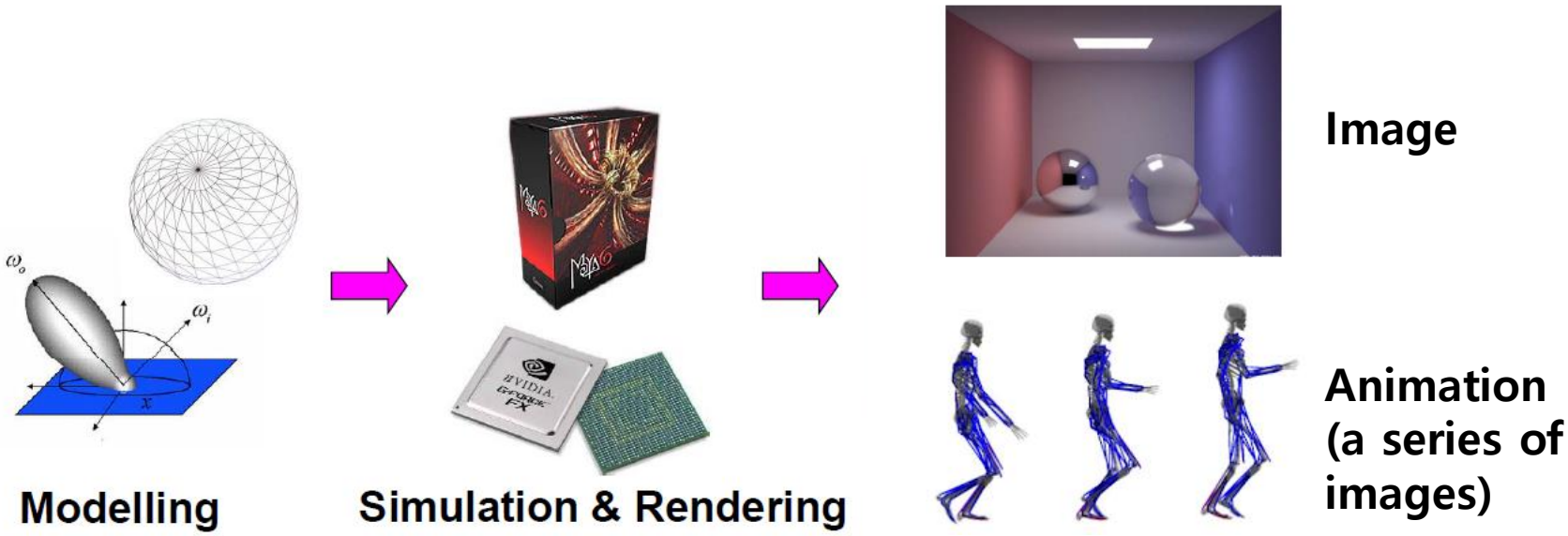
- Questions:
  - In a (both online and offline) lecture, you can ask questions using slido.com (will be explained later).
  - In a lab session, TA will guide you on how to ask questions.

- Attendance check - Lecture
  - Online quiz submission (will be explained later)

- Attendance check - Lab session
  - Minimum session participating time for attendance: **20%** of session duration

What is Computer Graphics?

- The study of creating, manipulating, and using visual images in the computer.

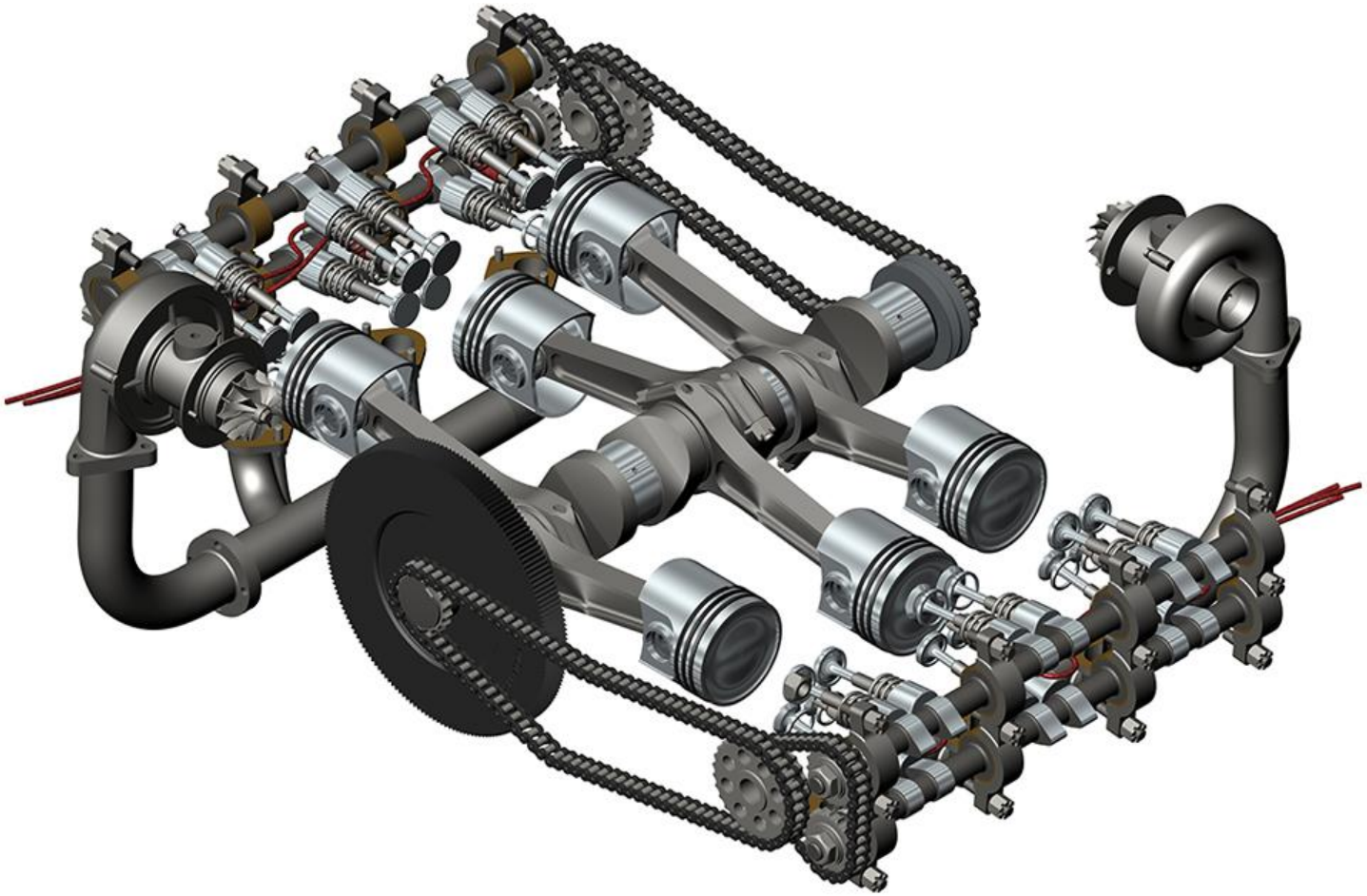


Movies & Games

Encanto

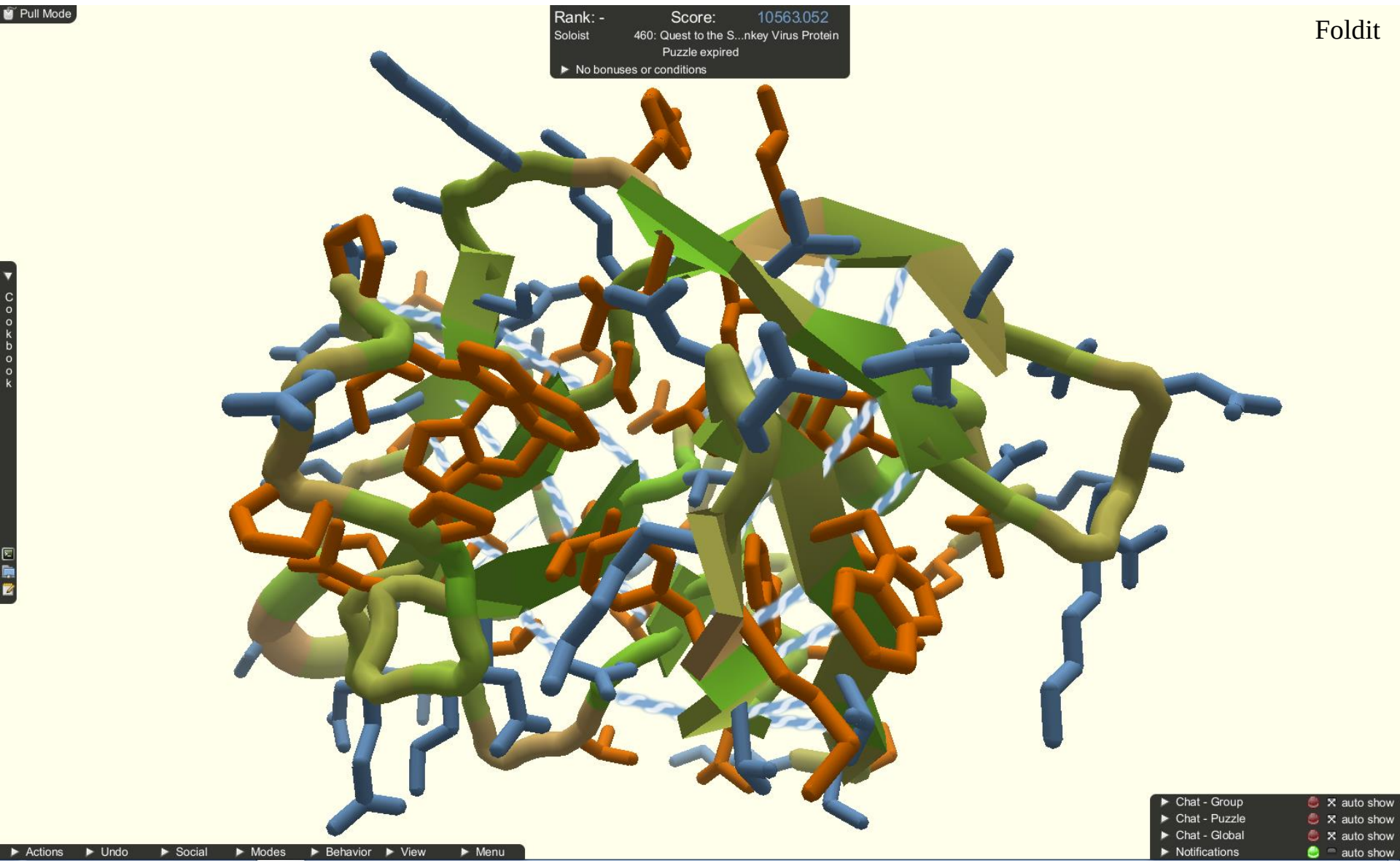
Red Dead Redemption 2

Engineering



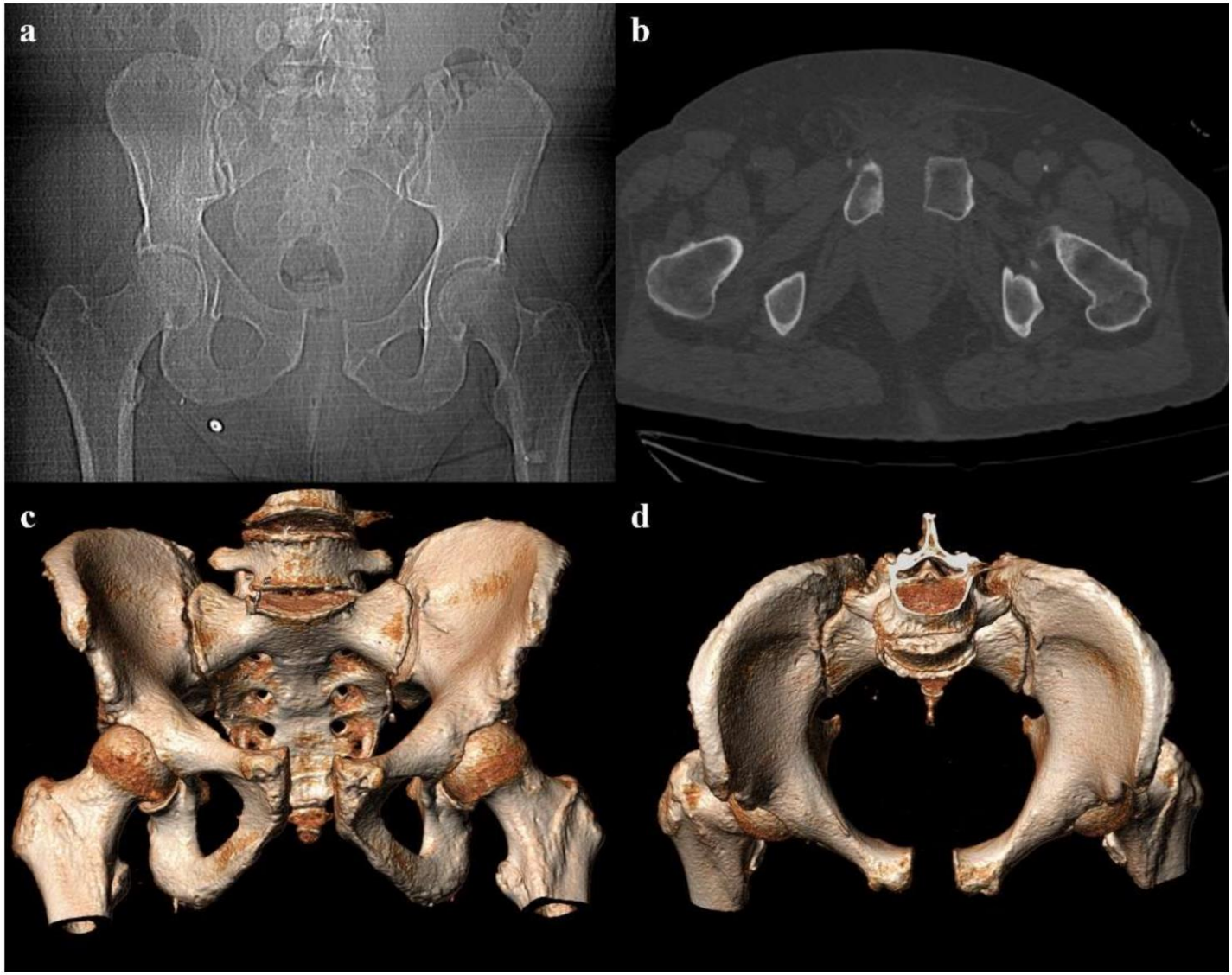
Solidworks

Natural Science



Foldit

Medical Science



CT images and volume rendering

Course Overview

- Computer Graphics: Mathematics made visible

- In this course, you will
  - Explore fundamental computer graphics & mathematics ideas
  - Write cool programs (using Python and legacy OpenGL)

- You will not
  - Learn sophisticated computer graphics techniques
  - Learn about modern OpenGL APIs
  - Write large programs

Course Overview

- As “implementation examples” of the fundamental computer graphics ideas, we’ll use:
- Legacy OpenGL (mainly)
- On-line WebGL demos (sometimes)
- Blender: An open-source 3D graphics tool (sometimes)

Prerequisites

- Basic knowledge of linear algebra
  - Vectors, matrices, and related operations (dot product, cross product, determinants...) are the most common tools in computer graphics.
  - But don't worry. I think that if you know how to calculate matrix multiplication, 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	Lab	Lecture	Mon	Wed
1		1 - Course Intro	~~2/28~~	3/2
2		2 - Introduction to NumPy & OpenGL	3/7	3/9
3	Lab1 - Environment Setting, Lab2 - Gitlab, LabAssignment2	3 - Transformation 1	3/14	3/16
4	LabAssignment3	4 - Transformation 2	3/21	3/23
5	LabAssignment4	5 - Rendering Pipeline, Viewing & Projection 1	3/28	3/30
6	LabAssignment5	6 - Viewing & Projection 2, Mesh	4/4	4/6
7	LabAssignment6	7 - Lighting & Shading	4/11	4/13
8	LabAssignment7	8 - Hierarchical Modeling	4/18	4/20
9	Midterm Exam	Midterm Exam	4/25	4/27
10	No lab	No class	5/2	5/4
11	LabAssignment8	9 - Orientation & Rotation	5/9	5/11
12	LabAssignment9	10 - Kinematics & Animation	5/16	5/18
13	LabAssignment10	11 - Curves	5/23	5/25
14	LabAssignment11	12 - More Lighting, Texture	5/30	6/1
15		13 - Rasterization & Visibility	6/6	6/8
16	Final Exam	Final Exam	6/13	6/15

Lectures & Labs

- Lecture will be held every Wednesday except Mar 07 (next Monday).
- Lab will be held every (next) Monday.

- Lecture (by instructor)
  - Traditional classroom-based learning.

- Lab (by TA)
  - Time for solving lab assignment problems by yourselves.
  - The TA and an undergraduate mentor will help you.

Lab assignments

- 1 lab assignment per each lab session
  - with 1~2 problems

- The goal is to let you understand what you've just learned in lectures every week.
  - The problems would not be too difficult.
  - TA and the undergraduate mentor will help you to solve the problems as much as possible.

- Due: 23:59 on the day of the lab session.

Class assignments

- 3 class assignments during the semester
- More challenging programming assignments.
- The due date will be two to three weeks after the assignment is given.

Policy for Assignments

- **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.
  - Collaboration encouraged, **but assignments must be your own work.**

Grading

Midterm exam	35%
Final exam	35%
Lab assignments	12.5%
Class assignments	12.5%
Attendance	5%

- You will get "F" for more than 5 absences in lectures or 5 absences in the labs.
- 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	25%~30%
B	30%~35%
C	40%

About Laptop

- Lecture
  - The lecture slides contains many Python code.
  - During lectures, you can run and test the code on your laptop.

- ~~Lab~~
  - ~~The lab is held in a laptop-only training room.~~
  - ~~If you want to borrow a laptop, contact the TA by email until the lab in this week.~~
  - ~~But, I strongly recommend you to bring your laptop at lab sessions.~~

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 sessions, TA will try to use English.
  - You can ask TA personally in Korean.
  - Of course, TA will try to give answers in English when asked in English.
- Now, let's take a quick look at prev. slides in Korean.

Questions – Slido.com

- After lecture, 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 lecture, 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**
- **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 time.**
  - Not after lecture time
  - Not in the lab sessions
  - No written answers

- Please ask questions **anonymously**.
  - Just leave your name blank when post a question.

Quiz & Attendance – Slido.com

- 3 quiz problems per each lecture (using slido.com polls)
- Very simple questions – you have to submit an answer in two minutes.
- **We'll check attendance using quiz submission.**

Quiz & Attendance – Slido.com

- You **MUST** submit your answer in the following format:
  - **Student ID: Your answer**
  - **e.g. 2020123456: 4)**

- Attendance checking:

Attendance	Number of submissions in the format **- 3 times &&** You are **in the classroom (session)**
Late	Number of submissions in the format – **1~2 times &&** You are **in the classroom (session)**
Absence	Number of submissions in the format – **0 times** || You are **NOT in the classroom (session)**

- **3 lates are regarded as 1 absence.**

Quiz & Attendance – Slido.com

- If submitting a quiz answer without attending the class (session) is detected,

- I think he or she has been also absent from the previous lecture.

- → Check as “Absence” for two lectures

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. 2020123456: 4)**

- Note that you must submit all quiz answers **in this format** to be checked for “attendance”.

My recommendation for this class

- DO NOT recommend this class to those who...
  - want to easily earn good credits.
  - 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, please consider taking other classes instead.

Next Time

- Lab for this lecture: No lab
- Next lecture: Next **Monday**
  - 2 - Introduction to NumPy / OpenGL
- Preparations:
  - Install Python 3 and Numpy on your laptop before the next lecture

- Acknowledgement: Some materials come from the lecture slides of
  - Prof. Steve Marschner, Cornell Univ., http://www.cs.cornell.edu/courses/cs4620/2014fa/index.shtml