Computer Graphics

1 - Course Intro

Yoonsang Lee
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Course Information

- Instructor: Yoonsang Lee (이윤상)
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- Course Hompage
  - The Blackboard course homepage at portal.hanyang.ac.kr (or learn.hanyang.ac.kr)
  - Slides will be uploaded to **Course Content(코스 콘텐츠) – Lecture Slides(강의자료)** as soon as it is ready, but they may be updated just before the lecture.
  - **Therefore, please download lecture slides again at the beginning of each lecture.**

Real-time Video Lecture Policy

- This semester's lectures and labs will be given in online until further announcement.
- We use the "real-time video lectures" to minimize the difference from offline lectures.

- All students are required to join "Lecture Session" and "Lab Session" on time.

- Question policy:
  - "Lecture Session": Questions are available on another site (slido.com, which will be explained in the later slide).
  - "Lab Session": Click "raise hand" (at the bottom of the session screen) to indicate that you have a question. The TA or undergraduate mentor will talk to you in 1:1 chat in order.

- Attendance check
- Lecture session
  - Online quiz submission (using slido.com, which will be explained in the later slide)
  - Session participation records
- Lab session
  - Late: 10 minutes after session start
  - Absence: 20 minutes after session start
  - Minimum session participating time for attendance: 20% of session duration
- Common for Lecture & Lab
  - 3 lates are regarded as 1 absence.

What is Computer Graphics?

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

Modelling **Simulation & Rendering**

Image

Animation (a series of images)
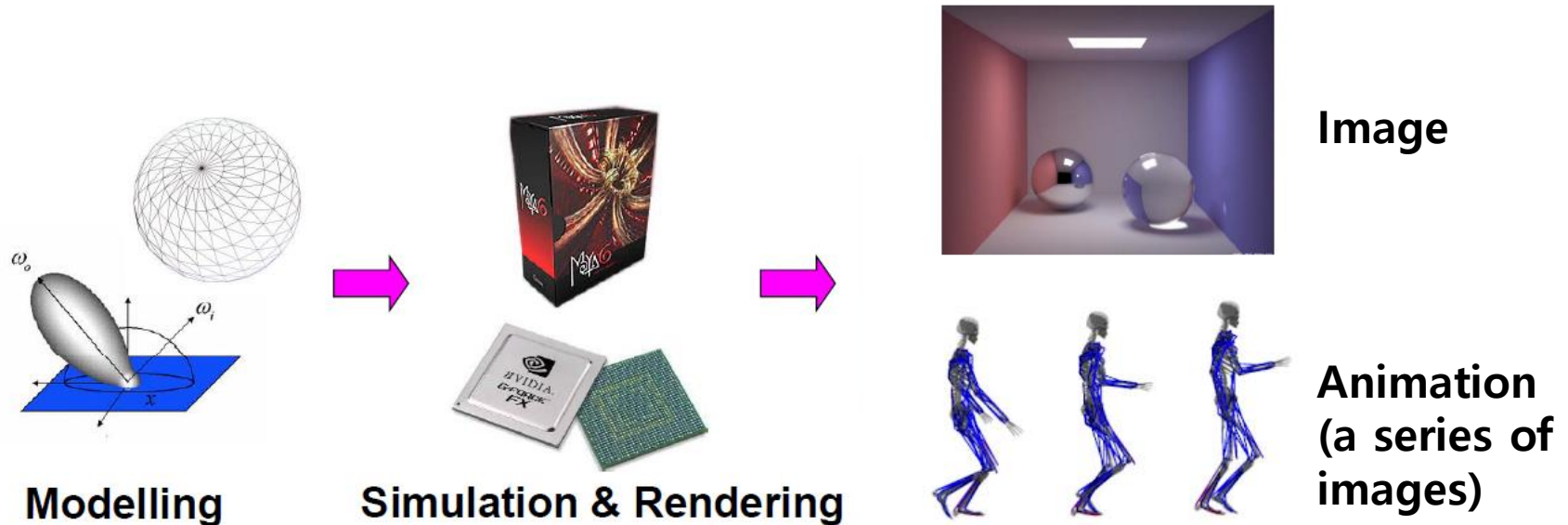
Computer vision inverts the process
Image processing deals with images
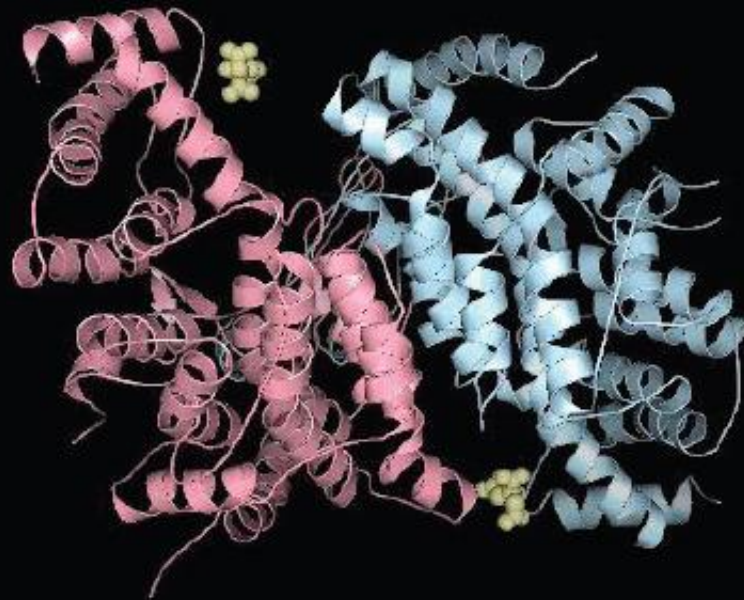
Movies & Games

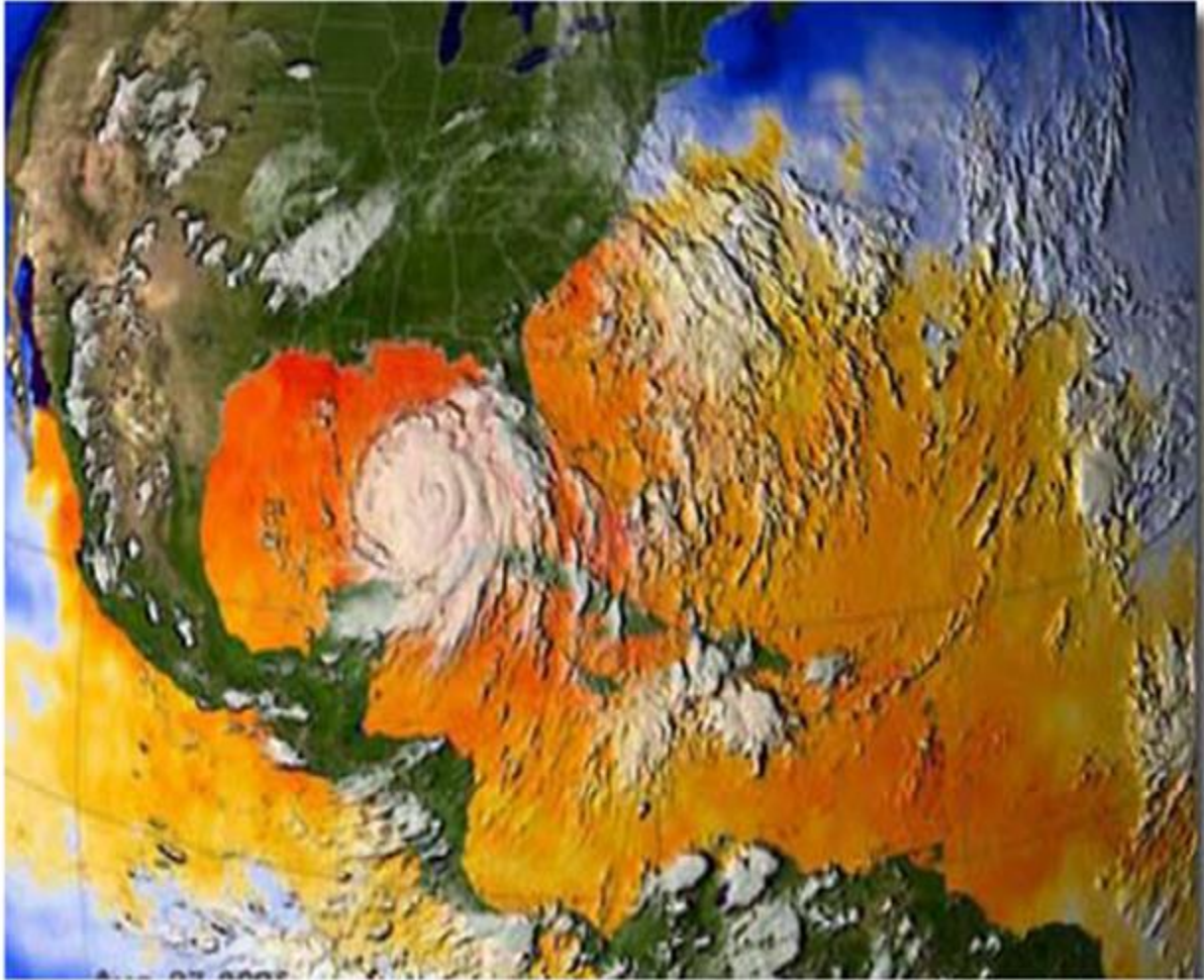Star Wars: The Last Jedi

Assassin's Creed Odyssey

Science and Engineering

Simulated deformation of citrate synthase during substrate binding

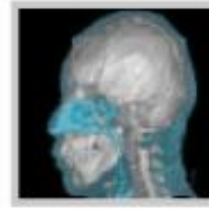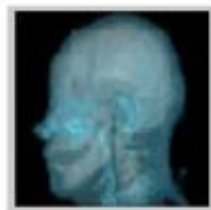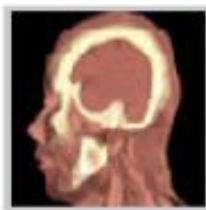Kalju Kahn, UCSB

Weather Visualization

LLNL

Computer-Aided Design

Medical Applications
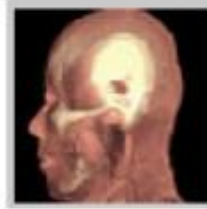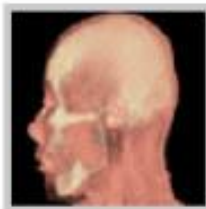
Rapidia homepage

Fine Arts

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 really big programs

Course Overview

- As "implementation examples" of the fundamental computer graphics ideas, we'll use:

- Legacy OpenGL (mainly)

- On-line WebGL demos (sometimes)

- Blender: open-source 3D graphics tool (sometimes)

Prerequisites

- Basic knowledge of mathematics
  - E.g., vector geometry, linear algebra

- Basic knowledge of programming skill
  - We'll use Python in this class.

- You don't need artistic sense!

- If you are unsure, consult the instructor at the end of this class.

Textbook & References

- **Textbook : Lecture slides**

- References
  - Fundamentals of Computer Graphics
    - 1,2 or 3rd edition
    - Peter Shirley et al.
    - AK Peters
  - OpenGL Programming Guide
    - Version 1.1 is available at internet
    - http://www.glprogramming.com/red/
    - Reference book is also available
    - http://www.glprogramming.com/blue
  - (I don't think you need to buy these books)
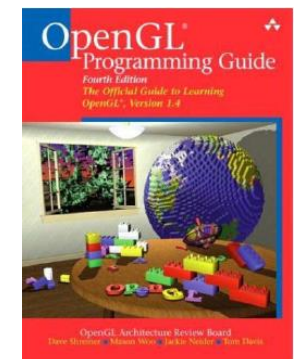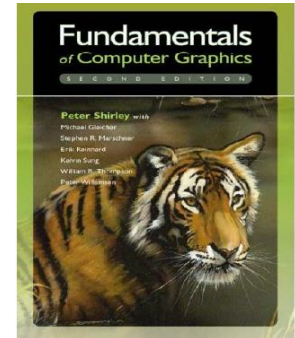
Schedule (subject to change)

Week	Topic	Mon	Wed
1	1 - Course Intro / Lab1 - Environment Setting	3/16	3/18
2	2 - Introduction to NumPy / OpenGL	3/23	3/25
3	3 - Transformation 1	3/30	4/1
4	4 - Transformation 2	4/6	4/8
5	5 - Affine Geometry, Rendering Pipeline	4/13	4/15
6	6 - Viewing, Projection	4/20	4/22
7	7 - Hierarchical Modeling, Mesh	4/27	4/29
8	Midterm Exam		5/6
9	8 - Lighting & Shading	5/11	5/13
10	9 - Orientation & Rotation	5/18	5/20
11	10 - Animation	5/25	5/27
12	11 - Curves	6/1	6/3
13	12 - More Lighting, Texture	6/8	6/10
14	13 - Rasterization & Visibility	6/15	6/17
15	Final Exam	6/22	

Lectures & Labs

- Lecture (Mon) + Lab (Wed)

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

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

Lab assignments

- 1 lab assignment per each lab session.
  - with 2~3 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.**

About Laptop

- Lecture
  - The lecture slides contains many Python code.
  - I'd like you to run & test the code during a lecture.
  - So, I recommend you to bring your laptop at lecture time.

- 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.

Grading

Midterm exam	30%
Final exam	30%
Lab assignments	15%
Class assignments	15%
Attendance	5%
Class attitude	5%

- To avoid F, you have to attend at least **9 lectures && 9 labs**
- Absences from 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%

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

- I know very well how uncomfortable it is to ask questions in the middle of class.

- To encourage questions, we'll use an online, anonymous Q&A platform – slido.com

Just Try It!

- Go to https://www.slido.com/

- Join #cg-hyu

- Ask any questions **in English!**
  - You can use Google Translator if you have difficulty writing 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 in two minutes.

- **I'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. 2017123456: 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 these two lectures

Just Try a Quiz!

- Go to https://www.slido.com/
- Join #cg-hyu
- Click "Polls"

- Submit your answer in the following format:
  - **Student ID: Your answer**
  - **e.g. 2017123456: 4)**

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

Classroom Etiquette

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

- May be reflected in "Class attitude" in your grade

My Recommendation for This Class

- DO NOT recommend to those who...
  - want to easily earn good credits.
  - expect lectures in fluent English.

- Recommend to those who...
  - wonder how movies/games render scenes.
  - are interested in the movement of objects/characters.
  - like visualizing something by coding.
  - have passion for computer graphics!

Lastly...

- If you agree on all these policies, see you this week's lab session!

- If not, please consider taking other classes instead.

Next Time

- Lab in this week:
  - 1-Lab-EnvSetting: Environment settings for lectures & assignments
  - Lab assignment 1

- Next lecture:
  - 2 - Introduction to NumPy / OpenGL

- Acknowledgement: Some materials come from the lecture slides of
  - Prof. Taesoo Kwon, Hanyang Univ., http://calab.hanyang.ac.kr/cgi-bin/cg.cgi
  - Prof. Steve Marschner, Cornell Univ., http://www.cs.cornell.edu/courses/cs4620/2014fa/index.shtml