Computer Graphics
(600.457/657)

Prof. Misha Kazhdan
misha@cs.jhu.edu
Outline

• Introduction
• Syllabus
• Coursework
• Miscellaneous
Introduction: What is CG?

• 2D image processing
• 3D object representation & manipulation
• Simulating physical processes & materials
• Animating any of the above
Introduction: What is CG?

2D image processing
- 3D object representation & manipulation
- Simulating physical processes & materials
- Animating any of the above

http://paulbakaus.com/
Introduction: What is CG?

• 2D image processing
• 3D object representation & manipulation
• Simulating physical processes & materials
• Animating any of the above

“The Jungle Book” Disney
Introduction: What is CG?

- 2D image processing
- 3D object representation & manipulation
- Simulating physical processes & materials
- Animating any of the above

Gringold et al. 2004
Introduction: What is CG?

- 2D image processing
- 3D object representation & manipulation
- Simulating physical processes & materials

Animating any of the above (4D)
Introduction: What is CG?

“You know it when you see it…”

http://www.creativecrash.com/tutorials/
Introduction: What is CG?

“You know it when you see it… maybe.”

http://www.creativecrash.com/tutorials/
Introduction: Applications

• Entertainment
• Computer Aided Design
• Scientific Visualization
• Training & Education
Introduction: Applications

Entertainment
- Computer Aided Design
- Scientific Visualization
- Training & Education

“How to Train Your Dragon 2”  
DreamWorks

“Gears of War 4”  
The Coalition
Introduction: Applications

- Entertainment
- Computer Aided Design
- Scientific Visualization
- Training & Education

Completely virtual model built in 3D:
- Shorten the development period
- Shorten the learning curve
Introduction: Applications

- Entertainment
- Computer Aided Design
- Scientific Visualization
- Training & Education

Flow Visualization
Roettger et al.

Neutron Star Collision
Courtesy of David Bock

Aspirin in RasMol
Courtesy of Michael Friendly

The Visible Human
Courtesy of NLM
Introduction: Applications

- Entertainment
- Computer Aided Design
- Scientific Visualization

Training & Education
Outline

• Introduction
• Syllabus
• Coursework
• Miscellaneous
Syllabus

- Image Processing (2D)
- Ray Tracing (3D)
- Rendering (3D)
- Modeling (3D)
- Animation (4D)
Syllabus

• Image Processing
  ◦ Quantization and Dithering
  ◦ Sampling
  ◦ Filters
  ◦ Warping, Morphing, and Compositing
Syllabus

• Ray Tracing
  ○ Cameras
  ○ Primitives
  ○ Lights
  ○ Spatial Data Structures
  ○ Reflection, Transparency and Refraction

• Rendering
  ○ Coordinate Systems and Modeling Transformations
  ○ Viewing transformations
  ○ Shading
  ○ Textures
  ○ Visibility
  ○ OpenGL
Syllabus

• Modeling
  ◦ Triangles
  ◦ Splines
  ◦ Subdivision Surfaces
  ◦ Procedural Models
  ◦ Point Based Models

• Animation
  ◦ Key-Framing
  ◦ Kinematics
  ◦ Dynamics
Outline

• Introduction
• Syllabus
• Coursework
• Miscellaneous
Coursework

• NB: Lots of work!
• Exams (30%)
• Programming assignments (60%)
• Class participation (10%)
Coursework

- NB: Lots of work!

Exams (30%)
  - Two midterms
  - No Finals
  - Absolutely no excuses will be accepted for missing the exams. Not taking the exam at the scheduled time = 0!

- Programming assignments (60%)
- Class participation (10%)
Coursework

• NB: Lots of work!

• Exams (30%)

Programming assignments (60%)
  ◦ Image Processing (15%)
  ◦ Ray Tracing (15%)
  ◦ OpenGL Rendering (15%)
  ◦ Animation (15%)

• Class participation (10%)
Coursework

• NB: Lots of work!

• Exams (30%)

Programming assignments (60%)

◦ Knowledge of C/C++ assumed!
◦ Must be turned in by 23:59 on due date
◦ 5 late days (combined)
◦ Notify TA in your readme if you use a late day
◦ Otherwise, late assignments receive NO credit

• Class participation (10%)
Coursework: Collaboration Policy

• You must write your own code
• You must reference sources of ideas/code

• It’s okay to:
  ◦ Discuss ideas with other students
  ◦ Get ideas from books, web sites, etc.
  ◦ Get “support code” from books, web, etc.
    » REFERENCE IT

• It is not okay to:
  ◦ Share code with other students
  ◦ Copy code from other students
  ◦ Use ideas or code from other sources without attribution
Coursework

• NB: Lots of work!
• Exams (30%)

Programming assignments (60%)
• Class participation (10%)

Bottom line:
If you don’t LOyE programming, don’t take this class!
Coursework

- NB: Lots of work!
- Exams (30%)
- Programming assignments (60%)
- Class participation (10%)
Outline

• Introduction
• Syllabus
• Coursework
• Miscellaneous
Miscellaneous

• Course web page:
  ○ http://www.cs.jhu.edu/~misha/Fall17

• Piazza page:
  ○ http://piazza.com/jhu/fall2017/600457657

• No required text book.
  ○ Additional reading:
    » Computer Graphics: Principles and Practice in C
      Foley, van Dam, Feiner, and Hughes
    » Computer Graphics, C Version  Hearn and Baker
      OpenGL  Neider, Davis, and Woo
    » Fundamentals of Computer Graphics  Shirley
Miscellaneous

• Teaching Assistant(s):
  ○ Michael Peven

• Office hours:
  ○ Mine: Monday 2:00 – 3:00 @ Malone 229
  ○ Michael's: Fridays noon – 1:00 @ Malone 122

• Keeping in touch:
  ○ Email: cs457@cs.jhu.edu
  ○ Note:
    » Do not send code snippets.
    We will not debug your code over e-mail!
    » Do not ask us if your implementation is correct.
Assignment 1:

- Image Processing
- Due October 1 @ 11:59 pm
- Even if you won't start working on the code until later, download it and try compiling ASAP to make sure that things are correctly set up on your system.