Computer Graphics
(600.357 / 600.457)

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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

“Cars 2” Pixar/Disney
Introduction: What is CG?

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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)

Team Fortress 2: Meet the Heavy, Valve
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”
DreamWorks

“Gears of War 3”
Epic Games
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

Microsoft Flight Simulator

Image courtesy of Agrawala et al.
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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

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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.
    » But 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%)
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Bottom line:
If you don’t LOVE programming, don’t take this class!
Coursework

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• Exams (30%)
• Programming assignments (60%)

Class participation (10%)
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Miscellaneous

- Course web page:
  - http://www.cs.jhu.edu/~misha/Fall15
- No required text book.
- Additional reading:
Miscellaneous

• Teaching Assistant(s):
  ◦ TBA

• Office hours:
  ◦ Mine: Wednesday 2:00 – 3:00 @ Malone 229

• Keeping in touch:
  ◦ Email: cs357@cs.jhu.edu
  ◦ Note: Do not send code snippets. We will not debug your code over e-mail!
Miscellaneous

Assignment 1:

• Image Processing
• Due September 26