CS 4810
Introduction to Computer Graphics

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Acknowledgement: slides by Misha Kazhdan, Allison Klein, Tom Funkhouser, Adam Finkelstein and David Dobkin
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
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Introduction: What is CG?

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- Animating any of the above

“Ratatouille” Pixar/Disney
Introduction: What is CG?

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

Procedural Shader from Pixar Studios
Introduction: What is CG?

- 2D image processing
- 3D object representation & manipulation
- Simulating physical processes & materials
- Animating any of the above (4D)
Introduction: Applications

- Entertainment
- Computer Aided Design
- Scientific Visualization
- Training & Education
- Commerce
- Art
Introduction: Applications

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Shorten the development period
Shorten the learning curve
Introduction: Applications

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Flow Visualization Roettger et al.

Aspirin in RasMol
Courtesy of Michael Friendly

The Visible Human
Courtesy of NLM
Introduction: Applications

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Microsoft Flight Simulator

Image courtesy of Agrawala et al.
Introduction: Applications

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Introduction: Applications

‣ Entertainment
‣ Computer Aided Design
‣ Scientific Visualization
‣ Training & Education
‣ Commerce
‣ Art

“Cyberflower Duet” by Roman Verostko

“Conflagration” by Diane Vetere
Introduction: More Videos!

https://www.youtube.com/watch?v=u3Z1hDwGEmM

https://www.youtube.com/watch?v=KF_a1c7zytw&feature=youtu.be

https://vimeo.com/94220982

https://www.youtube.com/watch?v=dgKjs8ZjQNg
Outline

- Introduction
- Syllabus
- Coursework
- Miscellaneous
Syllabus

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

- Image Processing
  - Human Vision
  - Color Models
  - Quantization and Dithering
  - Sampling
  - Filters
  - Warping, Morphing, and Compositing
Syllabus

› Ray Tracing
  › Cameras
  › Primitives
  › Lights
  › Intersection Acceleration Data Structures
  › Reflection, Transparency and Refraction
› Scanline Rendering
  › Coordinate Systems and Modeling Transformations
  › Viewing transformations
  › Shading
  › Textures
  › Visibility
  › OpenGL
Syllabus

‣ Modeling
  ‣ Triangles
  ‣ Splines
  ‣ Subdivision Surfaces

‣ Animation
  ‣ Key-Framing
  ‣ Kinematics
  ‣ Dynamics
Outline

‣ Introduction
‣ Syllabus
‣ Coursework
‣ Miscellaneous
Coursework

› LOTS of work!
› Exams (30%)
› Programming assignments (60%)
› Class participation (10%)
Coursework

› LOTS of work!
› Exams (30%)
   › Two in-class midterms (no final)
   › 10/16 and 12/04
› Programming assignments (60%)
› Class participation (10%)
Coursework

› LOTS of work!
› Exams (30%)
› Programming assignments (60%)
   › Image Processing (20%)
   › Ray Tracing (20%)
   › OpenGL Rendering (20%)
› Class participation (10%)
Coursework

• LOTS of work!
• Exams (30%)
• Programming assignments (60%)
  • Knowledge of C/C++ assumed
  • Must be turned in by 11:55PM on due date
  • 5 (discrete) late days
• 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.
    › 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 and first receiving permission from me
Coursework

‣ LOTS of work!
‣ Exams (30%)
‣ Programming assignments (60%)
‣ Class participation (10%)

Bottom line:
Expect to do a LOT of programming in this class!
Coursework

‣ Lots of work!
‣ Exams (30%)
‣ Programming assignments (60%)
‣ Class participation (10%)
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Resources

‣ Course web page:
  › www.cs.virginia.edu/~gfx/Courses/2014/IntroGraphics

› Suggested text books (on reserve at Brown):
Support

• TA: Mustafizur Rahman
• Office hours:
  • Mine: TuTh 11a-1p Rice 505
  • Mustafizur: MW 1p-3p Rice 430 #10
• Keeping in touch:
  • cs4810-f14@collab.itc.virginia.edu
Miscellaneous

- UVA Collab:
  - http://collab.itc.virginia.edu
  - We will use collab for submitting work, managing grades, and posting announcements
  - Setup your workspace and find this course NOW!
Miscellaneous

- Another GFX course!
- 6501 Computational Photography
- Rice 340
- TuTh 12:30p