CS 4810: Computer Graphics

Jason Lawrence

jdl@cs.virginia.edu

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

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- 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 (4D)
Introduction: What is CG?

“You know it when you see it…”

Work by Jim Rygiel for “102 Dalmatians”
Introduction: What is CG?

“You know it when you see it… maybe.”

Work by Jim Rygiel for “102 Dalmatians”
Introduction: Applications

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

Entertainment
- Computer Aided Design
- Scientific Visualization
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“El Laberinto del Fauno”

“Bioshock” 2K Games
Introduction: Applications

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  - Art

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

Boeing 7E7
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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• Commerce
• Art

Microsoft Flight Simulator

Image courtesy of Agrawala et al.
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http://www.miniusa.com/crm/mini_entrance.jsp
Introduction: Applications

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"Cyberflower Duet" by Roman Verostko

"Conflagration" by Diane Vetere
Outline

• Introduction
• Syllabus
• Coursework
• Miscellaneous
Syllabus

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

• Image Processing
  o Human Vision
  o Color Models
  o Quantization and Dithering
  o Sampling
  o Filters
  o 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 midterms
    • 10/12 and 12/05

• 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:
  o Discuss ideas with other students
  o Get ideas from books, web sites, etc.
  » But reference it!
• It is not okay to:
  o Share code with other students
  o Copy code from other students
  o Use ideas or code from other sources without attribution and first receiving permission from me
Coursework

• Lots of work!
• Exams (30%)

Programming assignments (60%)
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Bottom line: Expect to do a LOT of programming in this class!
Coursework

• Lots of work!
• Exams (30%)
• Programming assignments (60%)
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Resources

• Course web page: www.cs.virginia.edu/~gfx/Courses/2011/IntroGraphics

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

• TA:
  - Liu Zhenyang (introduce yourself!)

• Office hours:
  - Mine: MW 3:30 – 5:30 @ Olsson 212 -> Rice 505
  - Liu: TBA
  - Or, by appointment

• Keeping in touch:
  - Email classmates: cs4810@collab.itc.virginia.edu
Miscellaneous

- UVA Collab:
  - [http://collab.itc.virginia.edu](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!