CSC 240
Computer Graphics

Fall 2015
Smith College
Outline: 9/9

- Introductions
- What is computer graphics?
- Syllabus
- Images and pixels
- Python lab
What is computer graphics?

- Creating images using a computer
- Manipulating images
- Modeling and simulation
- Animation and game design
- User-interface design
Creating images
Creating images
Creating images

Brain MRI scan, by Ken Glaser/Corbis, National Geographic
Manipulating images

"DaVinci MonaLisa1b" by David R. Tribble
Manipulating images
Modeling and simulation
Modeling and simulation

Adaptive tissue modeling, Vidal et al, 2006
Animation

“Steamboat Willie”, Disney and Ub Iwerks, 1928
Animation

“Monsters Inc”, Disney/Pixar, 2001
Animation

“Frozen”, Disney, 2013
Game design
Game design

Angry Birds, Gaming To Learn
User-interface design

Buy your iPad Air 2
Buy now and get free shipping.

1. Choose a finish
   - Silver
   - Gold
   - Space Gray

2. Choose storage
   How much storage is right for you?
   - 16GB
     From $499
   - 64GB
     From $599
   - 128GB
     From $699

3. Choose connectivity
   What’s the difference?
   - Wi-Fi only
   - Wi-Fi + Cellular

apple.com
What is computer vision? (not this class!)

- Understanding [natural] images
- Examples: google books, image tagging, self-driving cars

Facebook facial recognition
Computer vision

Jeremy Hsu, IEEE Spectrum
Syllabus
Course Goals

- Algorithms and math behind graphics
- Programming skills
- Artistic expression
- Resources for pursuing computer graphics further
Topics (tentative)

- Graphics pipeline and pixel coloring
- Lines, 2D shapes, and fill algorithms
- Transformations
- Splines and Bezier curves
- Perspective
- 3D modeling
- Lighting, shading, and reflectance
- Texture mapping
- Ray tracing
- 3D printing
- (maybe) animation
Prerequisites

- CSC 111: Introduction to Computer Science
- Math 111: Calculus 1
Assignments

- Weekly (due Thursdays)
- Python (OpenGL) and Blender
- Submitted through Moodle
- Lab machines or your own computer

http://cs.smith.edu/~ssheehan/fall15/csc240/home.html
Online discussion

- Piazza
  - Class discussion
  - Homework help
  - Clarifications
  - Announcements

https://piazza.com/smith/fall2015/csc240/home

Vote for office hours!
Getting help

- Piazza
- Office hours (in office and in lab)
- Fellow students
- Tutoring at the Spinelli Center for Quantitative Learning
Honor code

- Collaboration encouraged!
- Please cite:
  - student collaborators
  - online resources, especially code
  - books
- For most assignments: individual original code
Assessment

- Homeworks: 50%
- Midterm exam: 15% (Oct 21, tentative)
- Final project: 20%
- Final quiz: 10% (Dec 14, tentative)
- Participation: 5%
What does CSC 240 fulfill?

- Minor in Computer Science: Digital Arts
- Arts & Technology minor
- Distribution requirement for the Computer Science major (software, theory)
What is a digital image?
Pixel coloring

- Red
- Green
- Blue
- “RGB”, each 0-255
Simple image format

PPM: Portable Pixel Map

Based on: slides from Eitan Mendelowitz
Simple image format

- comment
- width height
- max color value
- RGB, pixel 1

```
P3
# this is a comment
2 3
255
255 0 0
0 0 0
0 0 0
0 0 0
0 0 0
0 0 255
0 0 0
0 0 0
0 0 0
0 0 0
0 0 0
```

Based on: slides from Eitan Mendelowitz