Outline

- course content overview
- structure/logistics
- discuss: CG or photo?
  - (if time permits)

Course Content Overview

- create or manipulate images with computer
- this course: algorithms for image generation

What is Computer Graphics?

- virtual reality / immersive displays
- graphical user interfaces
- applications
  - simulation & visualization

This Course

- we cover
  - basic algorithms for
    - rendering – displaying models [focus]
    - modeling – generating models [tidbits]
    - animation – generating motion [tidbits]
    - programming in WebGL/Javascript
  - we do not cover
    - art/design issues
    - commercial software packages

Other Graphics Courses

- CPSC 426: Computer Animation
  - offered next year (2016-2017)
- CPSC 424: Geometric Modeling
  - offered 2017-2018
- CPSC 526: Computer Animation
- CPSC 533A: Digital Geometry
- CPSC 533B: Animation Physics
- CPSC 547: Information Visualization
- CPSC 530P: Sensorimotor Computation

Rendering

- creating images from models
  - geometric objects
    - lines, polygons, curves, curved surfaces
  - camera
    - pinhole camera, lens systems, orthogonal
  - shading
    - light interacting with material
  - illustration of rendering capabilities
    - Shutterbug series by Williams and Siegel using Pixar's Renderman
    - www.siggraph.org/education/materials/HyperGraph/shutterbug.htm

Modelling Transformation: Object Placement

Viewing Transformation: Camera Placement

Perspective Projection

Depth Cueing
Depth Clipping

Colored Wireframes

Hidden Line Removal

Hidden Surface Removal

Per-Polygon Shading

Gouraud Shading

Specular Reflection

Phong Shading

Curved Surfaces

Complex Lighting and Shading

Texture Mapping

Displacement Mapping

Reflection Mapping

Modelling
- generating models
  - lines, curves, polygons, smooth surfaces
  - digital geometry

Animation
- generating motion
  - interpolating between frames, states

Structure and Logistics
http://www.cs.ubc.ca/~van/papers/doodle.html
Course Information

- course web page is main resource
  - http://www.ugrad.cs.ubc.ca/~cs314/
- updated often, reload frequently
- discussion group: Piazza
  - signup: https://piazza.com/ubc.ca/winterterm2015/cpsc314
  - standard: https://piazza.com/class/iegj3tym4b
- use Piazza, not direct email, for all questions
  - make posts private if you need to post your code
  - bonus marks for significant Piazza contributions

Teaching Staff

- instructor: Tamara Munzner
  - call me Tamara or Prof. Munzner, your choice
  - gberseth@cs, suisse_silver@hotmail, jelborc@cs, qzhou@ece
- TAs: Glen Berseh, Silver Burla, Joao Cardoso, Qian Zhou
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Expectations

- substantial course!
  - heavy programming and heavy math
  - fun course!
  - graphics programming is addictive, make great demos
  - programming prereq
    - CPSC 221 (Program Design and Data Structures)
    - or both of CPSC 260 and ECE 320
  - math prereq
    - one of MATH 200 (Calculus III) or MATH 253 (Multivar Calc)
    - one of MATH 152 (Linear Systems) or MATH 221 (Matrix Algebra) or MATH 223 (Linear Algebra)

Course Structure

- 39% projects (programming)
  - 8% project 1: building beasts with shapes and math
  - 8% project 2
  - 8% project 3
  - 15% project 4: create your own graphics game
- 25% final (date TBA)
- 20% midterm (date TBA)
- 16% theory (written assignments/homeworks)
  - 4% each HW 1/2/3/4
- theory and programming projects interleaved

Programming Projects

- structure
  - WebGL / JavaScript
  - cross-platform, works on any modern browser
  - template code will be provided for projects 1-3
- face to face grading in lab
- 4 projects
  - P1: building beasts
    - previous years: bison, spiders, armadillos, giraffes, frogs, elephants, birds, poodles, dogs, cats...
  - P2, P3: TBA
  - P4: create your own graphics game
- online Hall of Fame for P1 and P4
  - I’ll also show off best of project 1 in class

Face to Face Grading

- all programming projects marked this way
  - TAs mark projects 1/2/3, I mark project 4 myself
  - 10 min sessions in lab, signups posted before due date
  - arrive at least 5 min before your timeslot to set up
  - show timestamps on files (terminal window or file browser)
  - do not edit code after handing if you discover problem, copy to fresh directory and edit there
  - run code to give brief demo of required/extra functionality
  - brief walkthrough of your code with marker in editor
  - marker asks you questions about both high-level algorithms and low-level code

Late Work

- 3 grace days
  - for unforeseen circumstances
  - no explanations needed/wanted
  - strong recommendation: don’t use early in term
  - handing in late uses up approximately
  - unless you tell us otherwise
  - otherwise: 50% if one day (24 hrs) late, 0% afterwards
  - only exception: severe illness or crisis
  - as per UBC rules
  - must let me know ASAP (in person or email)
  - at latest, 7 days after return to school
  - must also turn in form with documentation (eg doctor note)

Regrading

- to request assignment or exam regrade
  - give me paper to be regraded, and also in writing
  - thus even if I agree with your original request, your score may nevertheless end up higher or lower
  - must let me know ASAP (in person or email)
  - at latest, 7 days after return to school
  - must turn in form with documentation (eg doctor note)

Labs

- labs start next week, no labs this week
  - Wed 3-4, Thu 1-2, Fri 1-2
  - TA coverage TBA
  - mix of activities
    - help with programming projects (office hours)
    - walking through example theory questions
    - tutorials on tools/languages
    - no deliverables (unlike intro classes)
  - strongly recommend that you attend
  - if you can’t attend your regular one and/or want more help, drop by another (if there’s space)
  - there will also be extra TA office hours tied to deadlines
  - times TBA

Teachings: Recommended Resources

- Foundations of 3D Computer Graphics
  - Steven Gortler, MIT Press
  - free online through UBC

- Fundamentals of Computer Graphics
  - Peter Shirley, AK Peters
  - free online through UBC (2nd ed)

- readings will be posted on schedule page
  - encouraged but not mandatory
  - pick whichever book suits your style