University of British Columbia
CPSC 314 Computer Graphics
Jan-Apr 2005

Tamara Munzner

Introduction

Week 1, Wed Jan 5

http://www.ugrad.cs.ubc.ca/~cs314
Course Structure

- 40% programming projects
  - 10% project 1 (building beasties)
  - 10% project 2 (flying frenzy)
  - 20% project 3 (graphics game)
- 25% final
- 20% midterms
  - 10% midterm 1 (week 6, Fri Feb 11)
  - 10% midterm 1 (week 11, Mon Mar 21)
- 15% written assignments
  - 5% each HW 1/2/3
Programming Projects

structure
  C++, Windows or Linux
  OpenGL graphics library
  GLUT for platform-independent windows/UI
  face to face grading in lab

project 1: building beasties
  previous years: elephants, birds, poodles
  Hall of Fame

project 3: create your own game
  Hall of Fame
Late Work

- 3 grace days
  - for unforeseen circumstances
  - strong recommendation: don’t use early in term
- otherwise: 25% per 24 hours
  - no work accepted after solutions handed out
- severe illness or crises, as per UBC rules
  - let me know ASAP (in person or email)
  - must also turn in form with documentation

Course Information

- course web page is main resource
  - [http://www.ugrad.cs.ubc.ca/~cs314](http://www.ugrad.cs.ubc.ca/~cs314)
  - updated often, reload frequently
- newsgroup is ubc.courses.cpsc.414
- note old course number still used
- readable on or off campus
- (no WebCT)
Labs

- normal labs
  - Mon 12:00-13:00, Tue 13:00-14:00, Tue 14:00-15:00, Wed 12:00-13:00, Thu 10:00-11:00, Fri 12:00-13:00

- special lab coverage hours
  - before project deadlines, will be posted
Teaching Staff

instructor: Dr. Munzner
  office hrs in CICSRC 011
    Wed 3:45-4:45
  and extra lab hours as posted

TAs: Dan Julius, Dana Sharon, Chen Yang

contact email
  {tmm,djulius,dsharon,cyang}@cs.ubc.ca
  use newsgroup not email for all questions that other students might care about
Required Reading

- Fundamentals of Computer Graphics
  - Peter Shirley, AK Peters

- OpenGL Programming Guide, v 1.4
  - OpenGL Architecture Review Board
  - v 1.1 available for free online

- readings posted on schedule page
Plagiarism and Cheating

don’t cheat, I will prosecute

insult to your fellow students and to me

programming and assignment writeups must be individual work

exception: project 3 can be team of two

can discuss ideas, browse Web

but cannot just copy code or answers

cite all sources of information

web sites, study group members, books

http://www.ugrad.cs.ubc.ca/~cs314/Vjan2005/policies.html#plag
Schedule (subject to change)

wk 1: Intro, Math Review
wk 2: OpenGL, Transformations
wk 3: Transformations, Viewing, Projections
wk 4: Lighting/Shading
wk 5: Shading, Rasterization
wk 6: Rasterization, Midterm Review, Midterm 1
wk 7: Hidden Surfaces, Clipping
wk 8: Textures
wk 9: Advanced Rendering, Picking
wk 10: Modelling, Midterm Review
wk 11: Midterm 2, TBD
wk 12: Visualization
wk 13: Animation, Final Review, CG in Movies
What is Computer Graphics?

- create or manipulate images with computer
- this course: algorithms for image generation
What is CG used for?

- graphical user interfaces
- modeling systems
- applications
- simulation & visualization
What is CG used for?

- movies
- animation
- special effects

Inspector Gadget © 1999 Walt Disney Pictures
Visual Effects by Dream Quest Images
What is CG used for?

- computer games
What is CG used for?

- images
- design
- advertising
- art
What is CG used for?

- virtual reality / immersive displays
Real or CG?

http://www.alias.com/eng/etc/fakeorfoto/quiz.html
Real or CG?
Real or CG?
Real or CG?
This Course

we cover

- basic **algorithms** for
  - rendering – displaying models
  - (modeling – generating models)
  - (animation – generating motion)
- programming in OpenGL, C++

we do not cover

- art/design issues
- commercial software packages
Other Graphics Courses

- CPSC 424: Geometric Modeling
- CPSC 426: Computer Animation
- CPSC 514: Image-based Modeling and Rendering
- CPSC 526: Computer Animation
- CPSC 533A: Digital Geometry
- CPSC 533B: Animation Physics
- CPSC 533C: Information Visualization
Rendering

creating images from models
- geometric objects
  - lines, polygons, curves, curved surfaces
- camera
  - pinhole camera, lens systems, orthogonal
- shading
  - light interacting with material

Pixar Shutterbug series
- Williams and Siegel using Renderman, 1990
- www.siggraph.org/education/materials/HyperGraph/shutbug.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
- physical simulation (cloth)
- motion capture (figure)