WHAT IS COMPUTER GRAPHICS?
THIS.

AND THIS.
THIS TOO.

AND EVEN THIS.
WHAT ARE AREAS OF CG?

2D IMAGING
2D IMAGING

• Digital Imaging
  – How to represent an image?
  – Store it?
2D IMAGING

• Digital Imaging
  – How to represent an image?
  – Store it?
  – Compress it?

• Processing and compositing
  – How to make it darker/brighter.
2D IMAGING

- Digital Imaging
  - How to represent an image?
  - Store it?
  - Compress it?

- Processing and compositing
  - How to make it darker/brighter?
  - Blur/sharpen?
  - Replace background?
  - Etc..
2D IMAGING

- Digital Imaging
- Processing and compositing

Color
- How to represent color
- Mix it?
2D IMAGING

- Digital Imaging
- Processing and compositing

Color
- How to represent color?
  - Mix it?
  - What colors do we see?

- What happens when we print it?
2D IMAGING

- Digital Imaging
- Processing and compositing

Color
- How to represent color?
  - Mix it?
- What colors do we see?
- What happens when we print it?
- In a hologram?

2D IMAGING

- Digital Imaging
- Processing and compositing

Color
- Vector Graphics
  - How to represent a curve?
2D IMAGING

- Digital Imaging
- Processing and compositing
- Color
- Vector Graphics
  - How to represent a curve?
  - How to emulate a paintbrush?
- Working with videos
2D IMAGING

- Digital Imaging
- Processing and compositing
- Color
- Vector Graphics
- Working with videos
- Image analysis
- ...

2D IMAGING

- Digital Imaging
- Processing and compositing
- Color
- Vector Graphics
- Working with videos
- Image analysis
- ...

9/9/2016
How to represent 3D shapes?
Model them?
MODELING

• How to represent 3D shapes?
• Model them?
• Modify them?

• How to capture (scan) a building? An animal? A molecule?
MODELING

- How to represent 3D shapes?
- Model them?
- Generate them?
- How to capture (scan) a building? An animal? A molecule?
- ...

ANIMATING
ANIMATING

- Rigging and skinning 3D characters
- Keyframe animations
ANIMATING

• Rigging and skinning 3D characters
• Keyframe animations
• Simulate physics on a character

RENDERING
How to draw 3D geometry on a 2D media?

How to add light?
RENDERING

How to draw 3D geometry on a 2D media?
How to add light?
How to draw (‘render’) materials differently?
- plastic?
- wood?
- glass?
- skin?

How to simulate cameras/lenses?
Context: CG Research at UBC

Course Details (aka Boring Bits)
TEAM

Instructor: Alla Sheffer
Office hour: Fri, 11-12 pm ICICS 005 (or X651)

TAs: Xinyi Zhang, Daniela Correa, Enrique Alberto Rosales Ruiz, Amon Ge

To contact us, use Piazza!
Only use e-mail for personal issues
Or come to the labs/office hours.

SUMMARY

Lectures: Mon Wed Fri  10-11, DMP 110
Labs: Tue 1-2, Wed 1-2 & 2-3, Thu 2:30 – 3:30 & 3:30-4:30
Labs start next week.

Grades: connect.cs.ubc.ca
Announcements, questions, etc.: Piazza
Course website: ugrad.cs.ubc.ca/~cs314
TEXTBOOK (optional)
Foundations of Computer Graphics by S.J.Gortler
Free online at ubc library

PREREQS

• Know thy maths!
  – Calculus
  – Linear algebra
  – Algorithms

(MATH 200 || MATH 253) &&
(MATH 152 || MATH 221 || MATH 223) &&
(CPSC 221 || (CPSC 260 && EECE 320))
THIS IS NOT AN EASY COURSE.

Heavy math
Heavy programming

GRADING

Programming Assignments (40%)
Theory Assignments/Home Quizzes (6%)
Midterms (24%)
Participation (2%)
Final Exam (28%)

+ Bonus (8%)
ASSIGNMENTS (40%+6%)

• Short theory assignments (1 week) + Home Quizzes (multiple choice) (6%)
  – 4-5 short theory assignments
  – Weekly multiple choice question quizzes

• Big programming assignments (40%), ~3 weeks

• Both will help you on midterms/final

EXAMS (24% + 28%)

Midterm 1: Wed, Oct 12th
Midterm 2: Mon, Nov 18th
Final: TBD
CODING

3 assignments will use WebGL + Javascript

It is your responsibility to learn Javascript, but we won’t need a lot of it

4th assignment will use pure C++

FACE TO FACE GRADING

• Understand each line of your code
• Plagiarism policy
PARTICIPATION (2%)

- Note taking
- Classroom
  - Clicker questions
- Review Questions
  - Multiple choice
  - Post weekly on piazza (private)
  - If selected your grade on containing quiz doubles

BONUS (8%)

- Much harder problems
- First 5 correct solutions accepted
- Not always explicit...
- Each problem worth 5 – 8%
- Max 8%
WHAT YOU WILL LEARN

Representation of 3D shapes
3D shape transformations
Rendering Algorithms
Shading and lighting models
Texturing
Raytracing

(Coding/Soft skills)

WHAT YOU WON’T LEARN

• Graphics “Tools”: How to use
  Maya/Photoshop/Zbrush etc.

• Artistic skills
ROADMAP

- Rendering Pipeline $\int dx$
- GLSL $\int dx$
- Transformations $\iiint dx\,dy\,dz$
- Rasterization $\int dx$
- Lighting $\iint dx\,dy$
- Texturing $\int dx$
- Blending $\int dx$
- Ray Tracing $\iint dx\,dy$
- Advanced topics: shading, modeling, color,... $\iiint dx\,dy$

</INTRO>

ugrad.cs.ubc.ca/~cs314
Piazza! Piazza! Piazza!
Office hour: Fri, 11am-12pm ICICS 187/X651