WHAT IS COMPUTER GRAPHICS?
THIS.

(Youtube) Far Cry 3 trailer
AND THIS.
THIS TOO.
AND EVEN THIS.
WHAT ARE AREAS OF CG?
2D IMAGING
2D IMAGING

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

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

- Digital Imaging
  - How to represent an image?
  - Store it?
  - Compress 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?
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?
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?
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
  - 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?
2D IMAGING

- Digital Imaging
- Processing and compositing
- Color
- Vector Graphics
- 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
- ...
MODELING
MODELING

• How to represent 3D shapes?
• Model them?
• Generate them?
MODELING

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

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

• How to represent 3D shapes?
• Model them?
• Generate them?
• How to scan a building? An animal? A molecule?
• How to deform a model?
MODELING

• How to represent 3D shapes?
• Model them?
• Generate them?
• How to scan a building? An animal? A molecule?
• How to deform a model?
• ...


ANIMATING

• Rigging and skinning 3D characters
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 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?
RENDELING

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?
TEAM

Instructor: Mikhail Bessmeltsev
Office hour: Fri, 1-2 pm ICICS 187

TAs: Ben Janzen, Henry Li, and Minchen Li

To contact us, use Piazza!
Or come to the labs/office hours.
SUMMARY

Lectures: Mon Wed Fri 12-1 pm, DMP 301
Labs: Tue Wed 1-2 pm, Thu 3.30 – 4.30 pm
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 (8%)
Midterms (24%)
Participation (2%)
Final Exam (26%)

+ Bonus (10%)
ASSIGNMENTS (40%)

- Short theory assignments (8%), 1 week
- Bigger programming assignments (40%), 2 weeks

- Both will help you on midterms
EXAMS (24% + 26%)

Midterm 1: Fri, Oct 9th
Midterm 2: Mon, Nov 9th
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
BONUS (10%)

- Much harder problems
- First 5 correct solutions accepted
- Not always explicit...
- Each problem worth 5 – 10%
- Max 10%
WHAT YOU WILL LEARN

Representation of 3D shapes
3D shape transformations
Rendering Algorithms
Shading and lighting models
Texturing
Raytracing
WHAT YOU WON’T LEARN

• 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 $\iint dx\,dy$
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