Computing Science Course Outlines 2022 Spring

CMPT 361 - D100 Intro to Computer Graphics

Instructor(s): Yagiz Aksoy, Manolis Savva

Calendar Objective/Description:
Intro to Computer Graphics

Instructor's Objectives:
Introduction to Computer Graphics (and Vision)

Classical computer graphics has had a focus on realistic image synthesis, when given an explicitly defined 3D scene. In its modern era, graphics research has extended its reach to cover the synthesis and generation of all visual content, beyond scene projection and rendering. Hence, there is often a need to first acquire an understanding of the visual information being processed and created, which is an analysis task studied in computer vision. Indeed, modern computer graphics has seen "an increasing integration of techniques from computer vision" (from page 2 of "Computer Graphics, Principles and Practice, Third Edition, by Hughes, et al.").

In this course, which will be co-taught by two instructors, we will offer an introduction to fundamental concepts and techniques in both computer graphics and computer vision, with more emphasis placed on material that is deemed central to both fields. With a focus on classical topics, we will also shed light on the most recent trend and developments in the fields and the interplay between them. Students completing this course will be well prepared for more advanced courses in both computer graphics and computer vision.

Programming assignments will be conducted in WebGL for the graphics-related problems and MATLAB for vision-related ones.

Prerequisites:
see go.sfu.ca

Topics:
- digital images and sensors (imaging basics and camera models)
- geometrical transformations, projections, and viewing
- image segmentation and filtering
- image transforms, sampling, and reconstruction
- epipolar geometry
- optical flow
- introduction to convolutional neural networks
- the graphics pipeline and programmable pipelines
- introduction to programming using OpenGL and shading language
- hidden-surface removal and visibility
- basic rendering techniques (illumination and shading, global illumination, ray tracing, texture mapping)
- curves and surfaces; polygonal models

Grading:
Four assignments (40%), one midterm (20%), and a final exam (40%).

**Required Books:**

**Recommended Books:**

**Academic Honesty Statement:**
Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).