CMPT 985 - G100 Graphics-HCI-Vis-Multimedia

**Instructor(s):** Richard Zhang

**Calendar Objective/Description:**
Graphics-HCI-Vis-Multimedia

**Instructor's Objectives:**
Machine Learning for Shape, Structure, and Functionality

In this research-oriented and seminar-based course, we will study and explore the latest research topics surrounding machine learning for 3D vision and computer graphics, with a focus on understanding, prediction, and generation of 3D shapes, their structures and functionalities. Our coverage will span the whole spectrum of how shapes are perceived and applied, from low-level representations such as point clouds, voxels, meshes, and implicit functions, to higher-level characterizations through part organizations and hierarchies, and all the way to contextual setups that reveal how objects are being used, i.e., affordance and functionality.

Classes will be held in the form of seminars, paper reading, and open discussions. Course material will be extracted from the current literature. At the end, each student will write a speculative (i.e., no implementation is requested) proposal for a new concept, algorithm, or application that is related to the covered topics.

**Prerequisites:**
see go.sfu.ca

**Topics:**
- Shape vs. structure vs. functionality
- Representation learning for 3D shapes
- Structure-aware shape processing: structure representations, inference, and co-analyses
- Learning generative models of 3D structures
- Affordance and functionality: how to describe, learn, and apply
- Other topics, e.g., creative modelling, AI for arts, etc., even including those from students

**Grading:**
Two paper presentations (40%); two paper reviews/critiques (30%); a written proposal for a future concept/design/problem/application related to one or more special topics covered in the course (30%) Grading scheme to be finalized at the start of course.

**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).