

COURSE SYLLABUS

CMPT 876: IMAGE AND ANIMATION SYNTHESIS

Catalogue Description

An advanced course in computer graphics, concentrating on techniques for synthesizing images and animations. Physical simulation for animation. Procedural modeling and texture synthesis. Data-driven computer graphics, including motion capture, image-based rendering and model acquisition. Further alternatives to traditional image formation methods, such as non-photorealistic rendering and point-based rendering.

Prerequisite(s): CMPT 829; or instructor approval

Lectures: scheduled as needed

Website: Google Drive

Instructor Information

Instructors: Carl Gutwin and Ian Stavness

Contact: Email: ian.stavness@usask.ca

Phone: 306-966-7995

Office Hours: Location: Thorv 377.4,

Hours: please schedule by email

Course Objectives

This course exposes students to modeling and simulation techniques for human applications. Students taking this course will:

- Survey different approaches to image synthesis (computer graphics)
- Survey different approaches to animation synthesis (computer animation)
- Learn the detailed principles of physics-based simulation
- Use 3D modeling tools to create 3D models
- Develop computer programs with existing modeling & simulation APIs

Student Evaluation

Grading Scheme

Reading Assignments	40%
Programming Assignments	10%
Research Project	50%
Total	100%

Reading Assignments

Readings will be assigned weekly and students are required to complete a structured summary/evaluation of each paper. Papers and summaries will be organized on Google Drive.

Programming Assignment

- Assignment 1 50% by end of term 3D Modeling in ArtiSynth
- Assignment 2 50% by end of term Baraff Particle System

Research Project

The research project is to be discussed with the instructor. It should fall within the areas of computer graphics, image processing, and/or machine learning. It is beneficial if it relates to your thesis directions.

- Deliverable 1 10% Feb. Proposal Report
- Deliverable 2 20% March. Technical Report
- Deliverable 3 30% April Final Presentation / Demo
- Deliverable 4 40% April Final Report

Reading List

Relevant research papers selected from books and conference and journal publications including, but not limited to the following venues: ACM Siggraph Courses, ACM Siggraph Asia, Soft Tissue Biomechanical Modeling for Computer Assisted Surgery, Computer Methods in Biomechanics and Biomedical Engineering. Papers will be posted to Google Drive.

Topics (not necessarily a complete list)

Topic	Subtopics
Computer graphics & modeling	Geometry, meshes, vertices, homogenous coordinates
Physics-based simulation	Select readings from "Soft Tissue Biomechanical Modeling for Computer Assisted Surgery" on rigid body mechanics, FEM approaches for human tissue modeling
Human simulation & modeling	Basic principles; Tools: Artisynt, Ansys, Zygote datasets and more
Medical Imaging	Different imaging modalities: MRI, CT, US, VF, fMRI, PET
From Imaging to Models	Image processing, segmentation, meshing; Tools: Amira, 3D Slicer, TurtleSeg
Applications	Graphics and animation in education, medicine, entertainment, ergonomics
Seminars	Select topics taken from ACM Siggraph Courses, to be determined.

Policies

Incomplete Course Work and Final Grades

When a student has not completed the required course work, which includes any assignment, by the time of submission of the final grades, they may be granted an extension to permit completion of an assignment. Extensions for the completion of assignments must be approved by the Department Head, or Dean in non-departmentalized Colleges, and may exceed thirty days only in unusual circumstances. The student must apply to the instructor for such an extension and furnish satisfactory reasons for the deficiency.

In the interim, the instructor will submit a computed percentile grade for the course which factors in the incomplete course work as a zero, along with a grade comment of INF (Incomplete Failure) if a failing grade. In the case where the instructor has indicated in the course outline that failure to complete the required course work will result in failure in the course, and the student has a computed passing percentile grade, a final grade of 49% will be submitted along with a grade comment of INF (Incomplete Failure).

If an extension is granted and the required assignment is submitted within the allotted time, the instructor will submit a revised computed final percentage grade. The grade change will replace the previous grade and any grade comment of INF (Incomplete Failure) will be removed. For provisions governing examinations and grading, students are referred to the University Council Regulations on Examinations subsection of the Calendar.

(2011 University of Saskatchewan Calendar/Academic Courses Policy)

Academic Honesty

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals subsection of the University Secretary Website and avoid any behaviour that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offense. Academic dishonesty is a serious offense and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct, <http://www.usask.ca/secretariat/student-conduct-appeals/StudentAcademicMisconduct.pdf>, as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals, <http://www.usask.ca/secretariat/student-conduct-appeals/StudentNon-AcademicMisconduct.pdf>.

Academic honesty is also defined and described in the Department of Computer Science Statement on Academic Honesty: <http://www.cs.usask.ca/undergrad/honesty.php>.

For more information on what academic integrity means for students see the Student Conduct & Appeals subsection of the University Secretary Website at: <http://www.usask.ca/secretariat/student-conduct-appeals/forms/IntegrityDefined.pdf>