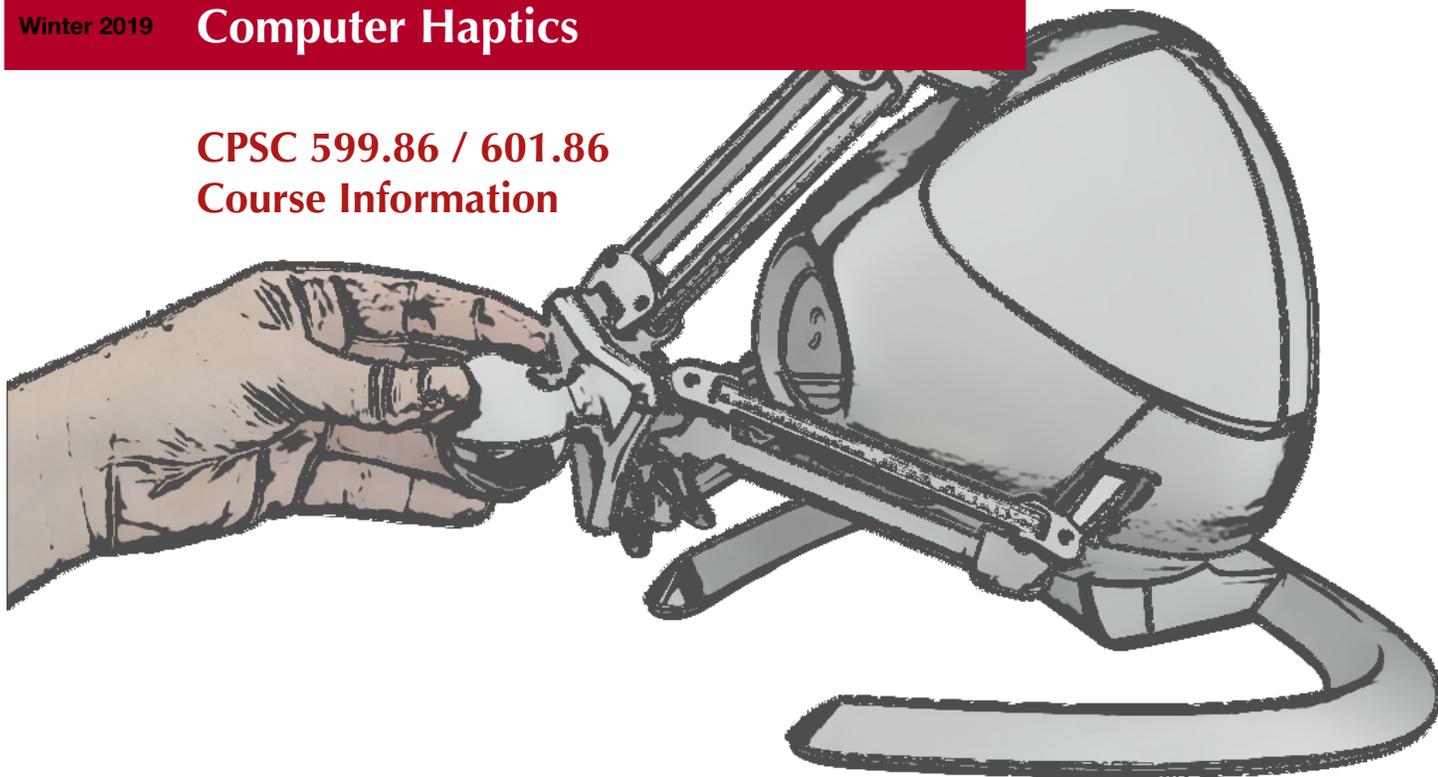


**CPSC 599.86 / 601.86  
Course Information****Course Description**

Computer haptics is the discipline concerned with generating and rendering haptic (touch and force feedback) stimuli to the human user. The goal is to develop virtual reality simulations and applications that incorporate haptic interaction. Topics include algorithms for haptic rendering, collision detection, simulation of rigid and deformable bodies, haptic interfaces, and psychophysics of touch.

**Meeting Times & Location**

The class meets on Mondays and Wednesdays at 13:00-13:50 in Science Theatres room 063, and on Fridays at 13:00-13:50 in the Math Science 156 teaching laboratory. The Friday session will take a format of a hands-on tutorial.

**Teaching Staff**

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**Prerequisites**

Students are expected to have the following background:

- ▶ Knowledge of basic computer science principles, including data structures and algorithms, and familiarity with programming in C++.
- ▶ Some familiarity with mathematical and computational representations of 3D objects (such as acquired from CPSC 453) is highly recommended, though not strictly required.

## Course Materials

Slides presented in lecture, programming assignments, and requirements for the course project will be posted on the (identical) course web pages located at

- ▶ <http://cpsc.ucalgary.ca/~sonny.chan/cpsc599.86/>
- ▶ <http://cpsc.ucalgary.ca/~sonny.chan/cpsc601.86/>

Reference materials for the course topics are primarily in the form of academic conference and journal articles. These readings will be posted under this course on the University of Calgary Desire2Learn system (<http://d2l.ucalgary.ca>). There is no required text for this course. However, if you do feel inclined to purchase a textbook for current and future reference, you may find the following suggestion useful:

- ▶ Ming Lin and Miguel Otaduy. *Haptic Rendering*. A K Peters, 2008.

You will also need access to a haptic interface in order to complete the programming assignments in this course. Novint Falcon devices are installed and available for your use in the MS 156 computer laboratory.

## Coursework & Grading

The final grade for this course will be calculated using the following distribution:

|     |  |
|-----|--|
| 10% | Programming assignment #1                              |
| 10% | Programming assignment #2                              |
| 10% | Programming assignment #3                              |
| 10% | Programming assignment #4                              |
| 5%  | Project proposal and presentation                      |
| 5%  | Project milestone presentation                         |
| 30% | Course project   |
| 20% | Final exam (CPSC 599) or research component (CPSC 601) |

The first four homework assignments will give the student the opportunity to learn and make use of the CHAI3D libraries while implementing some of the fundamental haptic rendering algorithms and techniques presented in class. While we encourage you to ask questions and discuss concepts with fellow students, **you must complete and submit these assignments individually.**

The suggested final project for the course is a video game or simulation that emphasizes haptic interaction. Alternative projects may be undertaken, subject to instructor approval, provided they are of comparable scope and have sufficient depth. It is generally expected that the Novint Falcon haptic devices provided for the programming assignments will also be used to run the simulation or play the game, but arrangements to use alternate platforms can be made as needed.

Projects will be graded and judged on creativity, technical challenge, quality of implementation, wow-factor, and mostly on their effective use of haptics toward providing a unique experience. Students will be expected to propose their projects and

demonstrate interim progress at a set milestone date in the form of graded in-class presentations. A one-page abstract summarizing the final project must be submitted, but no comprehensive report is required. **Students may work in teams of two to complete the course project.**

Students in CPSC 599.86 will have a registrar-scheduled final exam. Students in CPSC 601.86 will instead complete a research component for evaluation which can take one of two forms: a review paper on an advanced topic within the domain of the course (theoretical) or replication by implementation of an advanced technique described in a research paper, but not covered by the course assignments (practical). Instructor approval for the topic of review or implementation is required to ensure that it is of proper scope for the course.

### **Submission of Coursework & Late Policy**

Programming assignments must be submitted no later than 11:59 PM on the day they are due. The means for submitting your source code will be documented in the assignment handouts and announced in class.

We realize there are sometimes circumstances beyond your control that may prevent you from handing in your assignments on time, so we will allow a total of four (4) grace "late days" to use on the homework assignments as you need. For example, you may submit two homework assignments up to 2 days after their due dates, or a single assignment up to 4 days after the due date without penalty. Late assignments submitted beyond the allowed grace days will be penalized by a 50% grade reduction per day.

Each project team will be expected to give a live demonstration of their final project to the teaching staff at the scheduled end-of-semester project showcase. **No late course projects will be accepted, so keep your project scope manageable!**