



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
COURSE OUTLINE

1. **Course:** CPSC 601.92: Topics in Quantum Computing

Lecture Sections:

L08, MW 15:30-16:45, Peter Hoyer, ICT 653, 210-9468, hoyer@ucalgary.ca

Office Hours: By Appointment

Course Website: D2L

Computer Science Department Office, ICT 602, 220-6015, cpsc@cpsc.ucalgary.ca

2. **Prerequisites:** Consent of the Department

(<http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620>)

3. **Grading:** The University policy on grading and related matters is described in sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments	45%
Presentations (2)	20%
Project	35%

This course **will not** have a Registrar's Scheduled Final Exam.

This course will have a presentation worth 10% held during the regular final examination period (April 15th – 26th, 2017). The format will be a presentation of project with questioning. Students will be notified of the time and date of their presentation within two weeks of the release of the regular final examination schedule.

Special Regulations affecting Final grade: each of the above components will be given a percentage grade. The final grade will be calculated weighted by the percentage given above and then converted to a final letter grade using the attached cut-offs.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar. Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.6 of the University calendar.
5. **Scheduled Out-of-Class Activities:** REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY. If you have a clash with this out-of-class activity, please inform your instructor as soon as possible so that alternative arrangements can be made.
6. **Course Materials:**
None. Course is based on research articles.
Online Course Components:
D2L
7. **Examination Policy:** All components are open book. Two letter-sized pages of notes are permitted for both midterm test and final exam. Students should also read the Calendar, Section G, on examinations.
8. **Approved Mandatory and Optional Course Supplemental Fees:** None.
9. **Writing across the Curriculum Statement:** In this course, the quality of the student's writing in the weighted components of the course will be a factor in the evaluation of these components. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:** Students will be expected to participate as subjects or participants in projects. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

- a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K, Student Misconduct to inform yourself of definitions, processes and penalties.
- b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points which can be found in each classroom and building.
- c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Computer Science.
- d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>
- f) **Student Union Information:** VP Academic (403) 220-3911 suvpaca@ucalgary.ca SU Faculty Rep (403) 220-3913 science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca, Student Ombuds Office: (403) 220-6420 ombuds@ucalgary.ca, <http://ucalgary.ca/provost/students/ombuds>
- g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend your cell phone should be turned off unless instructed otherwise. All communications with other individuals via laptop computers, cell phones or other devices connectable to the internet in not allowed during class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- h) **U.S.R.I.:** At the University of Calgary feedback provided by students through the Universal Student ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI surveys.

Department Approval _____ Date _____

Faculty Approval for
out of regular class-time activity: _____
Date: _____

Faculty Approval for
Alternate final examination arrangements: _____
Date: _____

A signed copy of this document is on file in the Computer Science Main Office

CPSC 601.92 Percentage to Letter Grade Conversion Table

A+	98-100
A	90-97
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	66-69
C	62-65
C-	58-61
D+	54-57
D	50-53
F	0-49

CPSC 601.92 Syllabus

Tentative Topics Covered:

Quantum algorithmics, algorithmics, random walks, quantum random walk, analysis, lower bounds, spectral analysis, duality, boolean functions, quantum information theory, quantum complexity theory, quantum data structures, graph theory, learning graphs, electrical networks, algorithmic problems such as triangle finding, mathematical software packages, eigenvectors and complex vector spaces, probabilistic arguments, stochastic processes, asymptotic analysis.

Learning Outcomes:

1. Develop quantum processes (such as algorithms, circuits, and protocols) for computational problems.
2. Analyze quantum processes (such as algorithms, circuits, and protocols) for computational problems.
3. Prove asymptotically tight bounds on the quantum complexities for computational problems.
4. Explain basic research papers on quantum processes for computational problems.
5. Compare and contrast quantum processes for similar computational problems.

Allowable Sources:

No restrictions on source material.

Cited Sources:

The use of published literature is allowed. If you use any published literature (texts, articles, lecture notes, websites, etc) to complete your assignment, you must cite your sources. Please use the APA style guide for citations. If citing a website, please make sure you include the date you accessed the website.

Level of Collaboration between Students:

You are welcome to work and discuss the assignment with other students enrolled in this course in this term. Collaboration with any individual not enrolled in this course requires prior approval by the Instructor. You must clearly state whom your collaborators are, if any, for each problem on the assignment.

All written work that you submit must be your own sole work.

Disclosure Policy

If you discuss the assignments with others, make sure to cite these discussions.