Course Outline Form: Fall 2015

General Information

Course Title: NANO*3700/MATH*4150 - Introduction to Quantum Computing

Course Description: This course is an introduction to quantum computation and quantum information. Following an introduction to the basics of linear algebra, quantum mechanics, and computer science, the topics covered will be taken from the following: qubits, quantum channels, quantum circuit model and unitary gates, entanglement and quantum teleportation, introductory quantum algorithms, physical error models, no-cloning theorem, error-correcting codes, and quantum error correction.

Academic Department (or campus): Mathematics & Statistics

Semester Offering: Fall

Class Schedule and Location: MWF 10:30pm-11:20pm, MCKN Room 314

Instructor Information

Instructor Name: Dr. Bei Zeng
Instructor Email: zengb@uoguelph.ca
Office location and office hours: MACN 542, Wednesdays 2:30PM-4:30PM.

GTA Information

GTA Name: Tyler Jackson
GTA Email: tjacks05@uoguelph.ca
GTA office location and office hours: MACN 535, by appointment.

Course Content

Course Website:

** Go to http://www.uoguelph.ca
Click "Courselink" on the lower right corner and then login into Courselink using your central login ID and password

** Lecture notes, exercises, solutions and other course materials will be posted under Content. Course news will be posted under Course Home.

** There are also discussion forums that anyone in class (student, instructor or TA) can post questions under certain discussion topic (e.g. general question regarding the course, questions on each assignment), and may be answered by others (student, instructor or TA).

** Students are encouraged to post their general questions online for discussion. Individual issues may be addressed for arranging a meeting with the instructor or TA by email.

Course Tests:

** Throughout the semester, you will be expected to complete five in-class quizzes.

** Each quiz weigh 10%. Total weight of the in-class quizzes is 50%.

Tentative Schedule:

Week 1-2: **Unit 1 Quantum Mechanics** (Appendix A and Chap. 1)
Quiz 1 will be based on materials from this unit.
Week 3-4: **Unit 2 Quantum Computation** (Chap. 1,2)
Quiz 2 will be based on materials from this unit.
Week 5-7: **Unit 3 Quantum Algorithm** (Chap. 2,3,4)
Quiz 3 will be based on materials from this unit.
Week 8-9: **Unit 4 Quantum Error Correction** (Chap. 5)
Quiz 4 will be based on materials from this unit.
Week 10-12: **Unit 5 Quantum Communication** (Chap. 6)
Quiz 5 will be based on materials from this unit.

Final Examination Date and Time: Tuesday Dec. 15, 11:30AM-1:30PM

Final Exam Weighting: 50%

Course Resources

Required Texts:

Quantum Computer Science by David Mermin

You can get this book from the university bookstore

or via Amazon:
http://www.amazon.ca/Quantum-Computer-Science-David-Mermin/dp/0521876583/ref=sr_1_1?ie=UTF8&qid=1289416085&sr=8-1

or you may refer to Mermin's lecture notes
http://people.ccmr.cornell.edu/~mermin/qcomp/CS483.html

Course Policies

Grading Policies

** If you are unable to complete a quiz with a valid reason (appropriate documentation is needed, e.g. doctor note for the illness), then, your mark will be based on the remaining four tests. Also if you miss more than one tests with acceptable reasons, I will re-weight the quiz marks.

** If you miss the final exam for any reason, you must see your program counsellor. University regulations require specific procedures to be followed regarding the conduct of final examinations, including resource, if any, for missed final exam. These procedures are out of my control.

Course Policy regarding use of electronic devices and recording of lectures

** ***Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.***

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08...

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.csd.uoguelph.ca/csd/

Course Evaluation Information

Please refer to the Course and Instructor Evaluation Website

Drop date

The last date to drop one-semester courses, without academic penalty, is Friday Nov. 6th, 2015. For regulations and procedures for Dropping Courses, see the Academic Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08