

Tentative Syllabus

CMSC 643 Quantum Computation & Quantum Information

Instructor: Lomonaco

The course will begin with a brief overview of those topics in quantum mechanics and mathematics needed for the understanding of quantum computation. An incomplete list of topics covered in the course is given below:

- Quantum superposition and quantum entanglement
- Quantum decoherence and the resulting implementation barriers
- Quantum teleportation
- Quantum Turing machines
- Shor's Algorithm
- Grover's algorithm
- Quantum information theory
- Quantum data compression
- Quantum cryptographic protocols
- Quantum error-correcting codes
- The search for a physical implementation of a scalable quantum computer
- Various research level problems

Course Text:

- "Quantum Computation and Quantum Information" by Michael A. Nielsen and Isaac L. Chuang Cambridge University Press (2000) ISBN 0-521-63503-9

... And Other Material ...

- Other Books
- Four Lectures on Quantum Computation:
- Two Slides on Quantum Measurement
- Tutorials
- AMS Short Course Lecture Notes

- [L-O-O-P Lecture Notes](#)
- Plus additional material from the open literature, e.g., [arXiv quant-ph archive](#)

Prerequisites: CMSC 641 (or equivalent), reasonable mathematical & algorithmic maturity, and an intense desire to learn.

Grading:

The Course grade will be computed as follows:

25%	Exam 1
25%	Exam 2
25%	Homework & Class Participation
25%	Research Report

There is no final exam

