

# CMSC 643: Quantum Computation & Quantum Information Tentative Syllabus

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\*\*\* **UMBC Covid-19 Support Services** \*\*\*  
\*\*\* <https://covid19.umbc.edu/> \*\*\*  
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**Instructor:** Professor Samuel Lomonaco

**Contact Information:**

**Office:** ITE 306

**Office Hours:** <https://www.csee.umbc.edu/~lomonaco/How.To.Reach.Me.html>

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**Course WebPage:** <https://www.csee.umbc.edu/~lomonaco/Teachings19.html>

**Required Text:**

TBA

**Course Description:**

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

**Other Resources:**

[Other Books](#), [Four Lectures on Quantum Computation](#), [Two Slides on Quantum Measurement](#), [Tutorials](#), [AMS Short Course Lecture Notes](#), L-O-O-P [Lecture Notes](#), [arXiv](#), [Davis Front End for ArXiv](#)

**Prerequisites:** Reasonable mathematical & algorithmic maturity, and an intense desire to learn.

**Method of Evaluation:** Homework: 25%, Exam1: 25%, Exam2: 25%, Final Exam: 25%.

**Administrative Policies:**

On the date a homework or project is due, a hardcopy is to be handed in at the beginning of class. On that day, any homework or project handed in 10 minutes after class begins is deemed LATE. A LATE homework or project will not be accepted.

Electronic submissions of homework or project will not be accepted without prior permission of the instructor. If a student has instructor prior permission for electronic submission, then the homework or project is to be electronically submitted to the course grader, NOT to the instructor.

Exams will be given only at the scheduled times. There are No make-up exams.