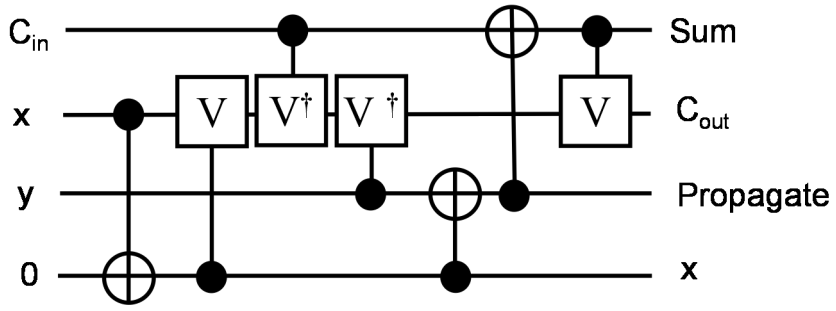
!!!!!!!! NEW COURSE ANNOUNCEMENT !!!!!!!!
Distance and On-Campus Sections Available

CSE 8381

QUANTUM LOGIC AND COMPUTING

Mon and Wed 12:30-1:50PM, Spring 2010 Semester



Quantum Logic Full-Adder*

Quantum computers can solve problems that are intractable on digital computers. Quantum computers are based on quantum logic circuits that manipulate qubits instead of binary digits (bits). Qubits allow for inherent parallelism not present in digital electronic bits and this parallelism is exploited in quantum circuits and computers. This course will provide a survey of quantum logic and quantum computing from the viewpoint of a computer scientist or computer engineer. This is not a course in quantum mechanics. Any needed quantum mechanical principles will be introduced as the course proceeds. The focus of the course will be on issues of quantum logic circuit design and quantum computer algorithms. Models of quantum logic elements and computing are emphasized while topics in underlying circuit devices will only be briefly surveyed.

PREQUISITES: CSE 4381 or CSE 5385 or EE 5381 or EE 5385 or consent of instructor

INSTRUCTOR: Mitch Thornton, Expressway Tower 800P, 214-768-1371, mitch@lyle.smu.edu

PLANNED TOPICS:

- Overview of Nanotechnology
- Quantum-dot Cellular Automata (QCA) Circuits
- Molecular Quantum Logic
- Qubits and Entanglement
- Measurement and Decoherence
- Mathematical Models
- Logical and Physical Reversibility
- Quantum Logic Gates and Circuits
- Overview of Physical Devices
- Quantum Logic Synthesis
- Review of Classical Theory of Computation
- Survey of Various Quantum Algorithms
- Classical and Quantum Encryption

**from D. Maslov, C. Young, D. M. Miller, and G. Dueck, Quantum Circuit Simplification using Templates, DATE, pp. 1208-1213, March 2005.*