CSE599D - Quantum Computing

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Course Website: `http://www.cs.washington.edu/cse599d`
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Lectures: Mon, Wed 10:30-11:50 a.m. in CSE 503

Grading: 10% one scribed lecture, 60% divided between four homework assignments (due Jan 19, Feb 7, Feb 23, Mar 9) and 30% for a project (due Mar 18).

Academic Accommodations: To request academic accommodations due to disability, please contact disabled Student Services, 448 Schmitz, (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accommodations, please present the letter to me so we can discuss the accommodations you might need in this class.

Course Description: This class will explore the idea that information can be quantum mechanical, and the consequences of this idea for computation, communication, cryptography and other information-processing tasks.

Topics:

- *Introduction:* Postulates of quantum theory. Super-dense coding, teleportation and the no-cloning theorem.

- *Algorithms:* Unstructured search (Grover's algorithm), hidden symmetries (Deutsch-Jozsa and Simon's algorithm), and factoring (Shor's algorithm).

- *Errors:* quantum error-correcting codes, quantum cryptography, fault-tolerant quantum computing

- *Information theory:* noisy quantum states, purifications, von Neumann entropy, data compression and noisy quantum channels.

Useful Supplementary Readings

Recommended textbook: *Quantum Computation and Quantum Information* by Michael Nielsen and Isaac Chuang. One copy is on reserve in the Engineering Library.

John Preskill's lecture notes: `http://www.theory.caltech.edu/people/preskill/ph229/`

David Mermin's lecture notes: `http://people.ccmr.cornell.edu/~mermin/qcomp/CS483.html`