ECES 753: Special Topics in Quantum Computing
Spring 2008

2008 Catalog Data: 20-ECES-753 (also listed as 15-PHYS-623) Special Topics in Quantum Computing: This course is aimed at a study of advanced topics in quantum computing. Because of its cross-disciplinary nature, this class will be taught by several faculty members with the field of specialty for each of the topics below.

Coordinator: M. Cahay, Professor of Electrical and Computer Engineering

Prerequisite: Permission of the instructor(s), recommended: ECES 622 - Introduction to Quantum Computing.

References: Michael A. Nielsen and Isaac L. Chuang
"Quantum Computation and Quantum Information", Cambridge University Press (2000)
Plus additional classnotes

Topics:

- Qubit and the Bloch sphere (M. Cahay)

- Quantum Circuits: Basics (P. Esposito)
  Quantum Search Algorithms (P. Esposito)
  Quantum Fourier Transform (P. Esposito)

- Quantum Cryptography - Factorization (P. Argyres)
- Quantum Error-Correction (P. Argyres)
- Other more specific topics (if time permits): M. Cahay/P. Argyres/P. Esposito
- Last 2 lectures (student presentations). There will also be some intermediate reports on status of project on the Bloch sphere animation package. At least two such presentations will be scheduled during the quarter.

Computer Usage: Students will be working in teams on special projects throughout the quarter. Knowledge of one programming language and one plotting package required. Knowledge of Mathematica and Mathlab preferred.

ABET category content as estimated by faculty member who prepared this course description:

Engineering Science: 50%

Engineering Design: 50%

Prepared By: ECE Dept (UC): M. Cahay , Physics Department (UC): P. Argyres and P. Esposito.

Website Upgrade: http://www.ececs.uc.edu/∼mcahay/qubit.html