33-658,758 Quantum Computation and Information Theory
Spring Semester, 2012

INSTRUCTOR

Prof. Robert B. Griffiths
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CLASS MEETINGS

Lectures: Tuesday and Thursday, 3:00 to 4:15 pm, Doherty Hall A 301 D
Seminars (12 unit course): Tuesday, 4:30 pm. Wean Hall 7316

WEB PAGE

http://quantum.phys.cmu.edu/QCQI/   or
http://www.andrew.cmu.edu/course/33-658 (or 33-758)

COURSE CONTENTS

Approximate number of class meetings is shown in parentheses

I. Quantum mechanics (7)
II. Teleportation, no cloning, cryptography (3)
III. Quantum algorithms (7)
IV. Noise and error correction (6)
V. Physical realizations (4)

COURSE REQUIREMENTS

Problems will be assigned weekly, and should be turned in on time if you expect them to be graded. You are welcome to discuss problems with anyone. However, *the assignment is then to be written up separately by each individual.* This includes writing your own computer program (for plotting, or whatever) when that is required. Copying what others have written and turning it in as your own work is a violation of university policy on cheating and plagiarism.

There will be two in-class exams during the term. In place of a final exam, you are to prepare a term paper, on the order of 15 to 20 pages, to turn in at the end of the course. The topic should have something to do with quantum computation or information theory, and must be approved by the instructor. It is always best to choose something you find interesting or exciting. A one page proposal will be due at a time to be announced later.

For the twelve unit course, 33-758, you are expected to attend a weekly seminar, make a few comments about it on the next problem assignment, and either give one seminar talk yourself during the semester. or else something equivalent, such as writing a brief essay on some topic different from your term paper.

TEXTBOOK and OTHER READING

The course textbook is Nielsen and Chuang, *Quantum Computation and Quantum Information* (Cambridge, 2000). It treats most of the topics we will take up in the course, and contains much additional material as well.

Especially during the first part of the course frequent reference will be made to Griffiths, *Consistent Quantum Theory* (Cambridge, 2002). A copy is on reserve in the Engineering and Science Library, and most of the book is online at:
http://quantum.phys.cmu.edu/CQT

A number of other books have been placed on reserve and are listed on the course web page.