CS 682A: Quantum Computing

1. **Description**: Quantum computation captured the imagination of computer scientists with the discovery of efficient quantum algorithms for factoring and fast algorithm for search. The aim of quantum computing is to do computation using the quantum meachanical effects. The study of quantum computation and information involves mathematics, physics and computer science.
2. **Prerequisites**: Linear Algebra, familiarity with Theory of Computing.
3. **Course Contents**: This course will primarily focus on the mathematics and computer science aspect of it. We will start the course by answering "why quantum computing?" and then move on to study the basics of linear algebra and computer science needed to understand the theory of quantum computation. Then, we will talk about quantum circuit model in which most of the quantum algorithms are designed. The final part of the course will look at quantum algorithms and the advantage they offer over classical counterparts.
4. **Lecture & Venue**: Mon-Thu 12-1:20 PM, KD103
5. **Office Hours**: by appointment (maximum 2 hours per week)
6. **Evaluation Components & Policies**: Two exams (30%) course project (50%), 2 Quizzes (20%)
7. **Course Policies**: No attendance, Honesty Practices and Withdrawal – in accordance with the Institute and DOAA norms.
8. **Books & References**: No specific textbook. Relevant references and texts (if needed) will be posted on the course homepage from time to time. Some of the following books may be useful.
    a. Quantum Computation and Quantum Information, M A Nielsen and I L Chuang.
    b. An Introduction to Quantum Computing, P Kaye, R Laflamme and M Mosca.
    c. Linear Algebra and its Applications, G. Strang.
    d. Matrix Analysis, Bhatia.