课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**量子计算基础**
2.	**课程性质** **Compulsory/Elective**	Compulsory
3.	**开课单位** **Offering Dept.**	Quantum Institute
4.	**课程学分/学时** **Course Credit/Hours**	3
5.	**授课语言** **Teaching Language**	中文
6.	**授课教师** **Instructor(s)**	翁文康、顾秀
7.	**开课学期** **Semester**	秋
8.	**是否面向本科生开放** **Open to undergraduates or not**	是
9.	**先修要求** **Pre-requisites**	（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

10. 教学目标
Course Objectives

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）
本课程为量子计算入门课程，面向研究生和本科高年级学生。完成本课程的学生应掌握:(1)通用量子逻辑门; (2)基本量子算法;(3) 量子模拟概念; (4)了解超导量子计算机
This course is an introduction to quantum computing for graduate students and senior undergraduate student. After completion of this course, students are expected to understand the following concepts: (1) universal quantum gates; (2) quantum algorithms; (3) Quantum simulation (4) basic knowledge of superconducting quantum computers.

11. 教学方法
Teaching Methods

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

Lecture + Tutorial

12. 教学内容
Course Contents
（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

Section 1	Overview (qubits, measurement, etc) (week 1)
Section 2	Quantum Computation: basic ingredients (gates, circuits, examples) (week 2)
Section 3	Quantum Computation: universal gate sets (exact and approximate) (week 3-4)

	Section 4	Quantum Computational Complexity (week 5)
	Section 5	Midterm exam (week 6)
	Section 6	Elementary Quantum Algorithms (Deutsch and Deutsch-Jozsa) (week 7)
	Section 7	Quantum search algorithms, quantum phase estimation, Fourier transformation (week 8-9)
	Section 8	Quantum Simulation (week 10)
	Section 9	Superconducting quantum computers (week 11-12)
	Section 10	Quantum dynamics, open quantum systems (week 13-14)
	Section 11	Current topics (week 15-16)

13. 课程考核
Course Assessment

（①考核形式 Form of examination；②.分数构成 grading policy；③如面向本科生开放，请注明区分内容。If the course is open to undergraduates, please indicate the difference.）

期末考试 50%，期中考 30%，作业 20%

14. 教材及其它参考资料
Textbook and Supplementary Readings

Quantum Computation and Quantum Information