國立東華大學

教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	應數導論AA			學年/學期 Academic Year/Semester	114/1
課程名稱(英文) Course Name in English	Introduction to Applied Mathematics				
科目代碼 Course Code	AM__6200AA	系級 Department & Year	碩士	開課單位 Course-Offering Department	應用數學系
修別 Type	必修 Required	學分數/時間 Credit(s)/Hour(s)	3.0/3.0		
授課教師 Instructor	/官彥良				
先修課程 Prerequisite					

課程描述 Course Description

This course offers a foundational introduction to quantum computation and quantum information, centered on the textbook Quantum Computation and Quantum Information by Nielsen and Chuang. Students will learn the core concepts of qubits, quantum gates, and quantum circuits, with a particular focus on understanding and implementing Shor's algorithm. Through a blend of theory and algorithmic insight, the course prepares students to grasp how quantum computing challenges classical computational boundaries.

課程目標 Course Objectives

由任課教師依各別專長區分之主題，設定個別目標。
Topics chosen by the teaching professor

	系專業能力 Basic Learning Outcomes	課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives
A	具備專業機率、統計知識與應用分析能力。Have well-founded expertise in probability and statistics, and good analytical ability in solving real problems.	●
B	具備程式設計與統計計算能力。Have the computer programming and statistical computing skills.	●
C	具備學習其它學科的能力，以期能邁向跨領域研究。Be able to study other fields of science so as to conduct interdisciplinary research in the future.	●

圖示說明Illustration ：● 高度相關 Highly correlated ○中度相關 Moderately correlated

授 課 進 度 表 Teaching Schedule & Content

週次Week	內容 Subject/Topics	備註Remarks
1	Introduction and Motivation	
2	Linear Algebra Review (I)	
3	Linear Algebra Review (II)	
4	Qubits and State Spaces (I)	
5	Qubits and State Spaces (II)	
6	Multi-Qubit Systems and Gates	

7	Number Theory Basics (I)	
8	Number Theory Basics (II)	
9	Number Theory Basics (III)	
10	Discrete Fourier Transform (I)	
11	Discrete Fourier Transform (II)	
12	Quantum Fourier Transform (I)	
13	Quantum Fourier Transform (II)	
14	Modular Exponentiation Circuits	
15	Order Finding (I)	
16	Order Finding (II) & Continued Fractions	
17	Shor’s Algorithm (I)	
18	Shor’s Algorithm(II)	

教 學 策 略 Teaching Strategies

☑ 課堂講授 Lecture ☑ 分組討論Group Discussion ☐ 參觀實習 Field Trip

☐ 其他Miscellaneous:

教 學 創 新 自 評 Teaching Self-Evaluation

創新教學(Innovative Teaching)

☑ 問題導向學習(PBL) ☐ 團體合作學習(TBL) ☐ 解決導向學習(SBL)

☐ 翻轉教室 Flipped Classroom ☐ 磨課師 Moocs

社會責任(Social Responsibility)

☐ 在地實踐Community Practice ☐ 產學合作 Industy-Academia Cooperation

跨域合作(Transdisciplinary Projects)

☐ 跨界教學Transdisciplinary Teaching ☐ 跨院系教學Inter-collegiate Teaching

☐ 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

學期成績計算及多元評量方式 Grading & Assessments									
配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)									
期中考成績 Midterm Exam									
期末考成績 Final Exam									
作業成績 Homework and/or Assignments	100%		✓	✓					
其他 Miscellaneous (_____)									

評量方式補充說明
Grading & Assessments Supplemental instructions

教科書與參考書目（書名、作者、書局、代理商、說明）
Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

Nielsen & Chuang《Quantum Computation and Quantum Information》

課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)
Teaching Aids & Teacher's Website(Including online teaching information.
Personal website can be listed here.)

googleclassroom: https://classroom.google.com/c/ODA1MjA5MjU1ODk0?cjc=ipll6hqx

其他補充說明 (Supplemental instructions)