Course Code	PHYS8352 (RPG)		
Title	Quantum information		
Offering Department	Physics		
Course Co-ordinator	Prof H F Chau Physics		
Course Co-ordinator Email	hfchau@hku.hk		
Teachers Involved	Name	Department	Percentage
	Prof H F Chau	Physics	100
Course Objectives	This course covers the theory of quantum information and computation and its applications in physics and computer science.		
Course Contents & Topics	Topics include: Quantum computer; quantum algorithms; quantum error correction; quantum information processing; quantum entanglement and quantum cryptograph.		
Course Learning Outcomes (CLO)	On successful completion of this course, students should be able to: CLO 1 examine the advantage and disadvantage of quantum computing over classical computing CLO 2 explain the inner workings of common quantum algorithms and quantum key distribution CLO 3 analyze the performance of quantum algorithms and quantum error correction codes CLO 4 apply quantum information techniques to solve problems in physics and computer science		
Pre-requisites (and Co-requisites and Impermissible combinations)	Nil		
Offer in 2025 - 2026	Y 2nd sem	Examination	May
Course Grade	A+ to F		
Grade Descriptors	A: Demonstrate thorough mastery at an advanced level of extensive knowledge and skills required for attaining all the course learning outcomes. Show strong analytical and critical abilities and logical thinking, with evidence of original thought, and ability to apply knowledge to a wide range of complex, familiar and unfamiliar situations. Apply highly effective organizational and presentational skills. B: Demonstrate substantial command of a broad range of knowledge and skills required for attaining at least most of the course learning outcomes. Show evidence of analytical and critical abilities and logical thinking, and ability to apply knowledge to familiar and some unfamiliar situations. Apply effective organizational and presentational skills. C: Demonstrate general but incomplete command of knowledge and skills required for attaining most of the course learning outcomes. Show evidence of some analytical and critical abilities and logical thinking, and ability to apply knowledge to most familiar situations. Apply moderately effective organizational and presentational skills. D: Demonstrate partial but limited command of knowledge and skills required for attaining some of the course learning outcomes. Show evidence of some coherent and logical thinking, but with limited analytical and critical abilities. Show limited ability to apply knowledge to solve problems. Apply limited or barely effective organizational and presentational skills.		

	Fail: Demonstrate little or no evidence of command of knowledge and skills required for attaining the course learning outcomes. Lack of analytical and critical abilities, logical and coherent thinking. Show very little or no ability to apply knowledge to solve problems. Organization and presentational skills are minimally effective or ineffective.		
Course Type	Lecture-based elective course		
Course Teaching & Learning Activities	Activities	Details	No. of Hours
	Lectures		36
	Tutorials		12
	Reading/Self study		80
Assessment Methods and Weighting	Methods	Details	Weighting in final course grade (%)
	Assignments		20
	Examination	2-hour written exam	50
	Test		30
Quota	9999 (9999 if no quota)		
Required/recommended reading and online materials	Lecture notes provided by Course Coordinator M A Nielsen and I L Chuang: Quantum Computation And Quantum Information (CUP, 2000) V Vedral: Introduction To Quantum Information Science (OUP, 2006) B. Schumacher & M. Westmoreland: Quantum Processes Systems, & Quantum Information (CUP, 2010) M. M. Wilde: Quantum Information Theory (CUP, 2017, 2nd ed.) J. J. G. Ripoll: Quantum Information & Quantum Optics With Superconducting Circuits (CUP, 2022) H.-A. Bachor & T. C. Ralph: A Guide To Experiments In Quantum Optics (Wiley-VCH, 2019, 3nd ed.)		