

Tamkang University Academic Year 111, 2nd Semester Course Syllabus

Course Title	COMPUTING IN THE QUANTUM WORLD: FROM FINGER COUNTING TO QUANTUM COMPUTING	Instructor	WU, JUNYI
Course Class	TNUUB0A NATURAL SCIENCES, 0A	Details	<ul style="list-style-type: none"> ◆ General Course ◆ Required ◆ One Semester
Relevance to SDGs	SDG4 Quality education SDG9 Industry, Innovation, and Infrastructure		
Departmental Aim of Education			
By exploring natural laws and studying scientific methods, to let students understand the impact of science and technology on human life, and to cultivate in them the ability to think independently, and to discover, analyse and solve problems. Also, throu.			
Subject Schoolwide essential virtues			
<ol style="list-style-type: none"> 1. A global perspective. (ratio:20.00) 2. Information literacy. (ratio:25.00) 3. A vision for the future. (ratio:10.00) 4. Moral integrity. (ratio:5.00) 5. Independent thinking. (ratio:25.00) 6. A cheerful attitude and healthy lifestyle. (ratio:5.00) 7. A spirit of teamwork and dedication. (ratio:5.00) 8. A sense of aesthetic appreciation. (ratio:5.00) 			
Course Introduction	In this course, one will learn the history of computing, the principle of quantum computing, and the current status and future challenges of quantum computing.		

The correspondences between the course's instructional objectives and the cognitive, affective, and psychomotor objectives.

Differentiate the various objective methods among the cognitive, affective and psychomotor domains of the course's instructional objectives.

I. Cognitive : Emphasis upon the study of various kinds of knowledge in the cognition of the course's veracity, conception, procedures, outcomes, etc.

II. Affective : Emphasis upon the study of various kinds of knowledge in the course's appeal, morals, attitude, conviction, values, etc.

III. Psychomotor: Emphasis upon the study of the course's physical activity and technical manipulation.

No.	Teaching Objectives	objective methods
1	An overall understanding of computer science.	Cognitive
2	The scientific principle of classical computing and quantum computing	Cognitive

The correspondences of teaching objectives : core competences, essential virtues, teaching methods, and assessment

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1		12345678	Lecture, Discussion, Practicum	Study Assignments, Report(including oral and written)
2		12345678	Lecture, Discussion, Practicum	Study Assignments, Report(including oral and written)

Course Schedule

Week	Date	Course Contents	Note
1	112/02/13 ~ 112/02/19	Finger counting and number systems 手指算數：數字系統	The syllabus is subject to further change or revision.
2	112/02/20 ~ 112/02/26	The counting machines: computers 那些會數數的機器們	
3	112/02/27 ~ 112/03/05	Public holiday	
4	112/03/06 ~ 112/03/12	Electromagnetism and 1st generation computers 電磁學和“電子”計算機	
5	112/03/13 ~ 112/03/19	Quantum physics and modern computers 量子物理與現代計算機	
6	112/03/20 ~ 112/03/26	Algorithms: let us count smarter 演算法：讓我們算得聰明一點點	
7	112/03/27 ~ 112/04/02	Cryptography: let us count safer 密碼學：讓我們算得安全一點點	

8	112/04/03 ~ 112/04/09	Public holiday	
9	112/04/10 ~ 112/04/16	Introduction to quantum information 量子資訊簡介	
10	112/04/17 ~ 112/04/23	Midterm Exam Week	
11	112/04/24 ~ 112/04/30	Qubits: let's talk about quantum a little bit 量子位 元：讓我們來講一點點量子吧	
12	112/05/01 ~ 112/05/07	Quantum entanglement and its spooky actions 量子糾 纏：那幽靈般的存在	
13	112/05/08 ~ 112/05/14	Quantum gates and the universal quantum computer 量子邏輯門和通用“量子”計算機	
14	112/05/15 ~ 112/05/21	Hello quantum world! My first quantum circuit 你 好·量子世界！我的第一個量子（電）路	
15	112/05/22 ~ 112/05/28	Hello quantum world! My first quantum circuit 你好·量 子世界！我的第一個量子（電）路	
16	112/05/29 ~ 112/06/04	Group oral presentation 期末分組口頭報告	
17	112/06/05 ~ 112/06/11	Group oral presentation 期末分組口頭報告	
18	112/06/12 ~ 112/06/18	Final Exam Week	
Requirement			
Teaching Facility	Computer, Projector		
Textbooks and Teaching Materials			
References	The Universal History of Computing: From the Abacus to the Quantum Computer (Georges Ifrah) Introduction to the History of Computing (Gerard O'Regan) Quantum Computation and Quantum Information (Nielsen and Chuang)		
Number of Assignment(s)	(Filled in by assignment instructor only)		
Grading Policy	◆ Attendance : 25.0 % ◆ Mark of Usual : 25.0 % ◆ Midterm Exam : % ◆ Final Exam : 50.0 % ◆ Other () : %		

Note	<p>This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php .</p> <p>※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.</p>
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