Tamkang University Academic Year 110, 2nd Semester Course Syllabus

Course Title	QUANTUM MECHANICS (II)	Instructor	WU, JUNYI
Course Class	TSPXM1A MASTER'S PROGRAM, DEPARTMENT OF PHYSICS, 1A	Details	◆ General Course ◆ Selective ◆ One Semester
Relevance to SDGs	SDG4 Quality education		

Departmental Aim of Education

Ⅰ. Conveying professional knowledge: Teach the students to learn the core knowledge of physics, to obtain the basic skills needed for physics research, and to apply the professional knowledge to physics related technologies.

Ⅱ. Analyzing and solving problems: Guide the students to analyze problems, and to acquire the mathematical ability to quantify conceptual models and also the capability needed to think and to innovate in solving various scientific and engineering problems.

Ⅲ. Training for experimental techniques: Teach the students on how to carry out and to verify various experiments, and at the same time to have the mentality of working cautiously and the awareness in operating safely.

Ⅳ. Expressing personal characteristics: Help the students to use their personal characteristics, like resolution, sincerity, and concentration, plus their professional skills to gain recognition among the executives and their peers.

Ⅴ. Cultivating team spirit: Train the students to have the organizational ability and the communicational skills to let them have the adaptability to integrate into a professional team, and to obtain the ability to bring out and to put to use the strength of the team to solve professional problems.

Ⅵ. Building international views: Comply to the trends of globalization to build an international learning environment and opportunities in order to educate the students to continue in their self-advancements, to absorb new worldwide knowledge, and to become a professional with international views in their future perspective careers.

Subject Departmental core competences

A. To acquire the core basic knowledge in the field of physics.(ratio:50.00)

B. To understand the overall features of specific fields of physics.(ratio:20.00)

D. To cultivate the basic ability to discover, to analyze, and to solve problems.(ratio:30.00)

Subject Schoolwide essential virtues

2. Information literacy. (ratio:50.00)

5. Independent thinking. (ratio:50.00)

	Course Introduction	In this course, we will learn some advanced methods for applications of quantum mechanics in particular systems. We will also learn how to deal with quantum systems that involve multiple particles. In the end, we will make a brief introduction to quantum information theory.

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	1. Master the mathematical tools in quantum mechanics. 2. Applications of quantum mechanics.	Cognitive

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

No.	Core Competences	Essential Virtues	Teaching Methods	Assessment
1	ABD	25	Lecture	Testing, Study Assignments

		Course Schedule	

Week	Date	Course Contents	Note
1	111/02/21 ~ 111/02/25	Chap 6. Identical particles	
2	111/02/28 ~ 111/03/04	Chap 6. Identical particles	
3	111/03/07 ~ 111/03/11	Chap 6. Identical particles	
4	111/03/14 ~ 111/03/18	Chap 7. Variational principle	
5	111/03/21 ~ 111/03/25	Chap 7. Variational principle	
6	111/03/28 ~ 111/04/01	Chap 7. Variational principle	

7	111/04/04 ~ 111/04/08	Chap 8. Pertubation theory	
8	111/04/11 ~ 111/04/15	Chap 8. Pertubation theory	
9	111/04/18 ~ 111/04/22	Chap 8. Pertubation theory	
10	111/04/25 ~ 111/04/29	Midterm Exam Week	
11	111/05/02 ~ 111/05/06	Chap 9. Scattering	
12	111/05/09 ~ 111/05/13	Chap 9. Scattering	
13	111/05/16 ~ 111/05/20	Chap 10. Relativistic quantum mechanics	
14	111/05/23 ~ 111/05/27	Chap 11. Quantum dynamics	
15	111/05/30 ~ 111/06/03	Chap 11. Quantum dynamics	
16	111/06/06 ~ 111/06/10	Chap 11. Quantum dynamics	
17	111/06/13 ~ 111/06/17	Chap 12. Quantum information: entangled states, EPR paradox, Bell inequality	
18	111/06/20 ~ 111/06/24	Final Exam Week	

Requirement	The course will be conducted in English.
Teaching Facility	Computer, Other (Whiteboard/Blackboard)
Textbooks and Teaching Materials	Introduction to Quantum Mechanics (David J. Griffiths)
References	A Modern Approach to Quantum Mechanics (John S. Townsend) Quantum Mechanics (Volume I, Claude Cohen-Tannoudji, Bernard Diu, Franck Laloë) Principles of Quantum Mechanics (Shankar)
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： % ◆ Mark of Usual：20.0 % ◆ Midterm Exam： 40.0 % ◆ Final Exam： 40.0 % ◆ Other〈 〉： %
Note	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 . ※ **Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**