هيئة تقويم التعليم
Education Evaluation Commission
المركز الوطني للتقويم والاعتماد الأكاديمي
National Center for Academic Accreditation and Evaluation

ATTACHMENT 5.

T6. COURSE SPECIFICATIONS (CS)

PHYS 505

Advanced Quantum Mechanics

هيئة تقويم التعليم
Education Evaluation Commission

Course Specifications

Institution:	KSU	Date:	25/12/2017
College/Department :			

A. Course Identification and General Information

1. Course title and code: Advanced Quantum Mechanics
2. Credit hours: 3
3. Program(s) in which the course is offered. MSc
(If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course: Dr. Vasileios Lempesis
5. Level/year at which this course is offered: MSc
6. Pre-requisites for this course (if any): PHYS 453, PHYS 501
7. Co-requisites for this course (if any):
8. Location if not on main campus:
9. Mode of Instruction (mark all that apply):

a. traditional classroom	✓	What percentage?	100%
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course?

The students have to master very important topics in quantum mechanics as the theory of angular momentum, time-independent perturbation theory and scattering theory.

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Fundamental concepts	1	3
Introduction to group theory and Lie algebra. Theory of total angular momentum (Lie algebra of the components of angular momentum, parity and time reversal, sum of two angular momentum and Clebsch-Gordan coefficients).	5	15
Applications of time- dependent and time –independent perturbation theory.	4	12
Scattering theory (Born approximation for the scattering wave, scattering using phase-shift analysis).	5	15

2. Course components (total contact hours and credits per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other:	Total
Contact Hours	Planed	45					45
	Actual	45					45

Credit	Planed	3					
	Actual	3					

3. Additional private study/learning hours expected for students per week. [ ]

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	At the end of course the student is supposed to develop skills to deal with fundamental concepts of quantum mechanics. Angular momentum theory, parity theory, time-independent perturbation theory, scattering theory.	Formal lectures	Class participation Formal Tests Pop quizzes Homework assignments Final written exam
1.2	The student is supposed to master the problems solving techniques for the above mentioned topics.	Demonstration of a large number of problems solution in the class	
2.0	**Cognitive Skills**		
2.1	Ability to think critically and analytically	Discussion in the class on the physical meaning and interpretation of the, beyond intuition, quantum physics topics	Class participation Formal Tests Pop quizzes Homework assignments
2.2			
3.0	**Interpersonal Skills & Responsibility**		
3.1	Students can complete all assignments in due time	Lectures in which students are made aware of the significance of time management Discussions with	Active class participation reflects the students ability to keep up with the concealed math ideas
3.2	Students can participate in class discussion and think critically		

3.3	Students can act responsibly and ethically in carrying out individual as well as group projects	students on ethical behaviour in conducting research Individual counselling on research projects and subject matter difficulties Group assignments where much of the most effective learning comes from the student explaining, discussing and defending her own ideas with her peers.	Homework assignments will attest to the student's ability to fulfil required tasks and respect deadlines Performance on midterms and final exams are evidence of the student's ability to recollect and synthesize information Instructor's assessment of student's performance and seriousness during individual practice hours
3.4	Students have the necessary skills to communicate, listen, negotiate, and evaluate their strengths and weaknesses as members of a team		
4.0	**Communication, Information Technology, Numerical**		
4.1	NA		
4.2			
5.0	**Psychomotor**		
5.1	NA		
5.2			

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	HOMEWORK I	3	20%
2	HOMEWORK II	6	
3	HOMEWORK III	9	
4	HOMEWORK IV	14	
5	MIDTERM EXAM I	6	20%
6	MIDTERM EXAM II	12	20%
7	FINAL EXAM	16	40%
8			

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

E Learning Resources

1. List Required Textbooks A) MODERN QUANTUM MECHANICS (Second Edition), J. J. Sakurai and J. Napolitano, Addison Welsey B) QUANTUM MECHANICS, Y. Peleg, R. Pnini, E. Zaarur, Schaums's Outline Series, Mc Graw Hill, 1998. C) QUANTUM MECHANICS (Third Edition), L. I. Schiff, Mc Graw-Hill International Editions.
2. List Essential References Materials (Journals, Reports, etc.)
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. PPT prepared notes and handouts for all lectures are available each week from lecturer's university website: http://fac.ksu.edu.sa/vlempesis/home
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)
2. Technology resources (AV, data show, Smart Board, software, etc.) Smart board to be used in addition to a blackboard. Lecturer's website to be used for uploading all the relevant materials of the course in electronic form available for students (homework with solutions, exams with solutions, slides for the course, exam results)
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3. Processes for Improvement of Teaching • Training for solving more exercise sessions • Workshops to facilitate the exchange of experiences amongst faculty members • Regular meetings where problems are discussed and solutions given • Attending professional development conferences
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) Samples of students' assignments and exams are collected every semester and reviewed from time to time as per required standards.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. Feed back mechanisms and evaluations are discussed in meetings with the males section of Physics Department, and continuous improvement is being implemented

Name of Course Instructor: **Dr. Vasileios Lempesis**

Signature: _____ Date Specification Completed: **25/12/2017**

Program Coordinator: _____

Signature: _____ Date Received: _____