Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specifications
(CS)

Course Specifications

Institution: Dammam University Date: 09/30/2014

College/Department : College of Sciences / Physics Department

A. Course Identification and General Information

1. Course title and code: Quantum mechanics II (PHYS 411)
2. Credit hours: **3** Cr. Hrs
3. Program(s) in which the course is offered: (B. Sc Degree in Physics)
4. Name of faculty member responsible for the course Faculty member of department of physics
5. Level/year at which this course is offered: Seventh Level
6. Pre-requisites for this course (if any) PHY 310
7. Co-requisites for this course (if any) Nothing else
8. Location if not on main campus College of Science for girls (department of physics)
9. Mode of Instruction (mark all that apply) a. traditional classroom ☐ What percentage? ☐ 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 main purpose of this course is to is to introduce the students to the main concepts and to prepare them to use the different methods to solve quantum mechanics problems.

The Student should be able to:

1. Analyze quantum mechanics problems within the areas of the mentioned topics.
2. Identify the relevant concepts and the different methods of quantum mechanics II
3. Decide on a solution strategy
4. choose the appropriate mathematical techniques to solve the problems.
5. Formulate the problem on paper, including necessary sketches.
6. Perform the necessary calculations.
7. Explain the steps
8. obtain the required solution, interpret the results, and judge the likelihood that the obtained solution is correct

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)

1- Explain strategy of the course in the beginning of the semester
2- Outlines of the physical laws, principles and the associated proofs.
3- Highlighting the day life applications whenever exist.
4- Encourage the students to see more details in the international web sites and reference books in the library.
5- Discussing some selected problems in each chapter.
6- Cooperate with different institution to find how they deal with the subject
7- Renew the course references frequently

Frequently check for the latest discovery in science

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
Variational theory	3	9
Time-independent perturbation theory .	3	9
Time-dependent perturbation theory	3	9
Scattering theory	3	9
Many-electrons atoms	2	6
Review (1)	1	2

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	28	14	---	----	-----	42
Credit						

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	Course Teaching	Course Assessment
1.0	**Knowledge**		
1.1	Learning fundamentals in Quantum mechanics II such as different approximate methods and their applications.	Demonstrating the basic information and principles through lectures and the	Solve some example during the lecture.
1.2	Understanding the physics of Quantum mechanics and their applications mentioned in the text	Discussing phenomena with illustrating pictures and diagrams	Exams**:** -Quizzes -Short exams (mid term exams) -Long exams (final)
1.3	Improving logical thinking.	Lecturing method: -Blackboard -Power point e-	Discussions with the students.

1.4	To use mathematical formulation to describe the physical principle or phenomena	Tutorials Revisit concepts Discussions	Ask the student to clear the misunderstanding of some mathematical
2.0	**Cognitive Skills**		
2.1	How to use physical laws and principles to understand the subject	Preparing main outlines for teaching	Midterm's exam. Exams, short quizzes
2.2	How to simplify problems and analyze phenomena	Define duties for each chapter	Asking about physical laws previously taught
2.3	Analyze and explain natural phenomena	Homework assignments	Writing reports on selected parts of the course
2.4	Represent the problems mathematically	Encourage the student to look for the information in different references.	Discussions of how to simplify or analyze some phenomena
3.0	**Interpersonal Skills & Responsibility**		
3.1	Work independently	Learn how to search the internet and use	Quizzes on the previous lecture.
3.2	The students learn independently and take up responsibility	Learn how to cover missed lectures	Checking report on internet use and trips.
3.3		Learn how to summarize lectures or to collect materials of the course.	Presenting the required research on time and the degree of the quality will show the sense of responsibility.
4.0	**Communication, Information Technology, Numerical**		
4.1	Problem solving.	Know the basic	Their interaction with the
4.2	Data analysis and interpretation.	Use the web for	The reports of different
4.3	Feeling mathematical reality of solving. Problems	Discuss with the student	Homework, Problem solutions assignment and exam should focus
4.4		Exams to measure	Comments on some

		mathematical skill	resulting numbers.
5.0	**Psychomotor**		
5.1			
5.2			

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.)

Course LOs #	**Program Learning Outcomes (Use Program LO Code #s provided in the Program**								
	1.1	**1.2**		**2.1**		**3.2**		**4.1**	
1.1									
2.1									

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination,	Week Due	Proportion of Total
1	Midterm 1	6th week	20
2	Midterm 2	11th week	25
3	Homework	Every week	05
4	Final exam	End of semester	50

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)

6 office hours per week

E Learning Resources

1. List Required Textbooks *"Quantum Mechanics" Volumes 1 & 2, by Claude Cohen-Tannoudji, Bernard Diu, and Franck Laloe (1977 John Wiley & Sons). * Introductory Quantum Mechanics, R.L. Liboff, Addison-Wesley * Introduction to quantum mechanics. David J. Griffiths * Principles of quantum mechanics. R. Shankar
2. List Essential References Materials (Journals, Reports, etc.)
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) Robert Scherrer, Quantum Mechanics, an accessible introduction, first edition (2006). Stephen Gasiorowicz, Quantum Physics, third edition (2003), Wiley Journal of Physica B Journal of
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc. http://www-fourier.ujf-grenoble.fr/~faure/enseignement/meca_q/ index.html http://alain.escano.pagesperso-orange.fr/TDPh_EM_01_C.pdf http://quantum-algorithms.com/
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software, Wikipedia

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.)

- Lecture room for 30 students
- Library

2. Computing resources (AV, data show, Smart Board, software, etc.)

- Computer room
- Scientific calculator.

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 - Midterm and final exam. - Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching Fortification of the student learning. Handling the weakness point.
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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. - Feedback evaluation of teaching from independent organization.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. 1- The following points may help to get the course effectiveness · Student evaluation · Course report · Program report

- Program Self study

2- According to point 1 the plan of improvement should be given.

3- Contact the college to evaluate the course and the benefit it add to other courses.

Add some subject and cut off others depending on the new discoveries in Mathematics and basic science.