Kingdom of Saudi Arabia
National Commission for
Academic Accreditation & Assessment

المملكة العربية السعودية
الهيئة الوطنية للتقويم
والاعتماد الأكاديمي

كلية العلوم التطبيقية
Faculty of Applied Sciences

Kingdom of Saudi Arabia
The National Commission for Academic Accreditation & Assessment

T6. Course Specifications (CS)

Course title: Nuclear Physics

Course code: 23064361-4

Course Specifications

Institution: **Umm AL – Qura University**	Date : **18/1/1439**
College/Department : **College of Applied Science – Department of Physics**	

A. Course Identification and General Information

1. Course title and code: **Nuclear Physics (code: 23064361-4)**
2. Credit hours: **4hrs (three hours lecture and one hour Lab.)**
3. Program(s) in which the course is offered. **BSc Physics**
(If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course
Dr. Adel MADANI (ammadani@uqu.edu.sa)
5. Level/year at which this course is offered : **4th Year / Level 7**
6. Pre-requisites for this course (if any) : **Quantum mechanics (1) (403345-4)**
7. Co-requisites for this course (if any) : ---
8. Location if not on main campus: **Main campus and Al-Zaher**
9. Mode of Instruction (mark all that apply)

a. traditional classroom	✓	What percentage?	80%
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other	✓	What percentage?	20%

Comments: Labs **20%**

B Objectives

1. What is the main purpose for this course?

The objectives of this course are to establish the meaning of the concepts of nuclear physics and elementary particles, and to ease out the theoretical models to describe the nuclear properties.

We want to be able:

The benchmark statement of the main learning outcomes are as follows:

1. *To understand basic fundamentals of nuclear properties.*
2. *The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)*
3. To understand the liquid drop model.
4. To understand the nuclear drop model.
5. To understand the origin of alpha transition within the nucleus.
6. *To understand the origin of Gamma transition within the nucleus.*
7. To understand the origin of Beta transition within the nucleus.
8. To understand the elementary particles.

The overall goal is to understand the fundamentals of nuclear physics.

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 Nuclear concepts, theories 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:

The course will cover the principle of Nuclear physics, such as Nuclear Properties of the matter , Liquid Drop and shell Model , radiation… . This course will provide a conceptual and

experimental background in physics sufficient to enable students to take courses that are more advanced in related fields.

1 Topics to be Covered :-

Topics	No of Weeks	Contact hours
1- Nuclear Properties		
1- Definitions & Nuclear radii	1	1
2- Nuclear Mass-Binding Energy		1
3- Nuclear Radiation, Energy levels.		1
4- Nuclear Isomers.	1	1
5- Angular Momentum, Parity and Symmetry		1
6- Dipole moment, qudropole moment		1
2- Liquid Drop Model		
1- Finding Energy	1	1
2- Sem-emperical Formula		2
3- Mass Spectrometer	1	1
4- Nuclear Reactions and Q-value		2
3- Nuclear Shell Model		
1- Single Particle model with square well and Harmocia Oscillator	1	1
2- Magic Numbers		1
3- Spin for Different nuclei		1
4- Excited rootes nuclear magnetic moments	1	1
5- Parity		2
6- Isotopic spin		1
4- Gamma Transitions		
1- Multiple Moments	1	1
2- Decay Constants		1
3- Selection Nucles		1
4- Angular Correlation	1	2
5- Internal Conversion		1
5- Alpha Transitions		
1- Heavy Ions-Stalitlity	1	2
2- Decay Constants		1

3- Tunnel Effect	1	2
4- Energy Levels		1
6- Beta Transitions		
1- Theorgy of B-decay	1	2
2- Allowed and Forbiddin transitions		1
3- Selection Nucles	1	2
4- Non Conservation of Parity		1
7- Elementary Particles		
1- Nucler Force and Meson Theory	1	2
2- Pions & Mions		1
3- Kaons & Hyperons	1	2
4- Classi Fiction of demeray Pancles		1
Total	14	42

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	**42**		**10**			**52**
Credit	**3**		**1**			

3. Additional private study/learning hours expected for students per week. 4

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	Define the physical quantities, physical phenomena, and basic principles.	1- Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: Board, Power point. 4. Discussions 5. Brain storming 6. Start each chapter by general idea and the benefit of it.	Solve some example during the lecture. Discussions during the lectures Exams: a) Quizzes (E-learning) b) Short exams (mid- term exams) c) Long exams (final) d) Oral exams .
1.2	Describe the physical laws and quantities using mathematics		
1.3	Determine the physical quantities at the Lab.	1. Doing team research or team project. 2.Doing team work to perform some experiments 3. Perform the experiments correctly. 4. Demonstrate the results correctly. 5. Write the reports about the experiment. 6. Discussion with the student about the results	Writing scientific Reports. Lab assignments Exam.

2.0	**Cognitive Skills**		
2.1	Apply the laws of physics to calculate some quantities.	1. Preparing main outlines for teaching. 2. Following some proofs. 3. Define duties for each chapter 4. Encourage the student to look for the information in different references. 5. Ask the student to attend lectures for practice solving problem.	1. Exams (Midterm, final, quizzes) 2. Asking about physical laws previously taught 3. Writing reports on selected parts of the course. 4. Discussions of how to simplify or analyze some phenomena.
2.2	Solve problems in physics by using suitable mathematics.		
2.3	Analyse and interpret quantitative results.		
2.4	Apply physical principle on day life phenomena.		
2.5	Derive the physical laws and formulas.		
3.0	**Interpersonal Skills & Responsibility**		
3.1	Show responsibility for self-learning to be aware with recent developments in physics	• Search through the internet and the library. • Small group discussion. • Enhance self-learning skills. • Develop their interest in Science through : (lab work, visits to scientific and research institutes).	• Evaluate the efforts of each student in preparing the report. • Evaluate the scientific reports. • Evaluate the team work in lab and small groups. • Evaluation of students presentations.
3.2	Work effectively in groups and exercise leadership when appropriate.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate effectively in oral and written form.	• Incorporating the use and utilization of computer, software, network and multimedia through courses • preparing a report on some topics related to the course depending on web sites	• Evaluating the scientific reports. • Evaluating activities and homework
4.2	Collect and classify the material for the course.		
4.3	Use basic physics terminology in English.		
4.4	Acquire the skills to use the internet communicates tools.		
5.0	**Psychomotor**		
5.1	Use experimental tools safely and correctly.	Follow up the students in lab and during carryout all experimental work.	• Practical exam. • Giving additional marks for the results with high and good accuracy
5.2	Determine the physical quantity correctly at the Lab.		

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 Specifications)**															
	1.1	**1.2**	**1.3**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**3.1**	**3.2**	**4.1**	**4.2**	**4.3**	**4.4**	**5.1**	**5.2**
1.1	✓															
1.2		✓														
1.3			✓													
2.1				✓												
2.2					✓											
2.3						✓										
2.4							✓									
2.5								✓								
3.1									✓							
3.2										✓						
4.1											✓					
4.2												✓				
4.3													✓			
4.4														✓		
5.1															✓	
5.2																✓

6. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Midterm 1	5th week	20 %
2	Midterm 2	10th week	20 %
3	Online quizzes	every week	10 %
4	Homework	Every week	10 %
5	Interactive discussions	Every week	10 %
6	Final exam	End of semester	30 %

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)

Each student will supervise by academic adviser in physics Department and the timetable for academic advice were given to the student each semester. (4hrs per week)

E Learning Resources

1. List Required Textbooks

- K. Heyde, Basic ideas and concepts in nuclear Physics, An introductory approach, second edition, Institute of physics publishing, Bristol and Philadelphia (1999) ISBN 0 7503-0534 7 hbk, 07503 0535 pbk.
- Irving Kaplan, Nuclear Physics, Second Edition, Addison-Wesley Publishing Company (1977).
- Kenneth S. Krane , Introductory nuclear Physics, , first edition, Jone Wily & Sons Inc. (1988) ISBN 0 - 471-80553-X .

* Burcham, Nuclear and Particle Physics, 2 Edition, Longman Publisher (1995),ISBN-10 : 0582 450888 , -13: 978 - 0582 4508882

2. List Essential References Materials (Journals, Reports, etc.)
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) Introductory Nuclear Physics, Krene, 1987
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc. www.uqu.sa/ammadani
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. • **Power points (use e-learning gate of Umm Al-Qura university)** • **Youtube videos(use e-learning gate of Umm Al-Qura university)**

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.) There are enough classrooms provided with a good accommodation, including good air condition, good Data show, and suitable white board. There are enough laboratories for experimental physics, provided with air conditions, good data show, and experimental equipment.
2. Computing resources (AV, data show, Smart Board, software, etc.) In each classroom and laboratories, there is a data show, and board.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Each Classroom and laboratories require a TV screen at least 65 inch-and smart and double layer white board.

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Course reports
- Course evaluation.

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Revision of student answer paper by another staff member.
- Analysis the grades of students.

3 Processes for Improvement of Teaching

- Preparing the course as PPT.
- Using scientific flash and movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

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.
- Independent evaluation by another instructor that give the same course in another faculty.
- Evaluation by the accreditation committee in the university.

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.

Name of Instructor: _____A.M.MADANI_____

Signature: _____ Date Report Completed: _____

Name of Field Experience Teaching Staff _____

Program Coordinator:_____

Signature: _____ Date Received: _____