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 580
Nuclear Structure

Revised January 2018 (Dr. Farouk Aksouh)

هيئة تقويم التعليم
Education Evaluation Commission

Course Specifications

Institution: **King Saud University**	Date: **1/1/2018**
College/Department : **Sciences / Physics and Astronomy**	

A. Course Identification and General Information

1. Course title and code: **Nuclear Structure Phys 580**
2. Credit hours: **3h**
3. Program(s) in which the course is offered. **M. Sc. In Physics Program**
4. Name of faculty member responsible for the course **Dr. Farouk Aksouh**
5. Level/year at which this course is offered: **2nd level / 1st year**
6. Pre-requisites for this course (if any): **481**
7. Co-requisites for this course (if any): **None**
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?

i- Familiarize students with the basic concepts in nuclear physics.
ii- Develop the students understanding and abilities in 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)

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

Course Description:
The course reviews basic nuclear properties, the nuclear force, various nuclear models, the three major decays (alpha, beta and gamma).

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Nuclear properties	**1**	**3**
The nuclear force	**2**	**6**
Nuclear models	**2**	**6**
Alpha decay	**2**	**6**
Beta decay	**2**	**6**
Gamma decay	**2**	**6**
Nuclear reactions	**2**	**6**
Nuclear Astrophysics	**2**	**6**

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**					**3**
	Actual	**3**					**3**

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

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.

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	**Nuclear properties**: matter and charge radius, mass, binding energy, angular momentum and parity, nuclear electromagnetic moments	**In-class lecturing where the previous knowledge is linked to the current and future topics.** **The relation between the lectures topics and the nuclear physics experiments is discussed.** **Homework assignments**	**Major and final exams**
1.2	**The nuclear force:** The deuteron, nucleon-nucleon scattering	**Idem**	**Idem**
1.3	**Nuclear models**: The shell-model, single and multi-nucleon configurations, Nilsson model, Collective models	**Idem**	**Idem**
1.4	**Alpha decay:** description, energetic, systematic, theory, angular momentum and parity rules, spectroscopy	**Idem**	**Idem**
1.5	**Beta decay:** energetic, comparison with alpha decay, Fermi theory, experimental tests of the theory, angular momentum and parity rules, comparative half-lives and forbidden decays, spectroscopy, neutrino physics, double-beta decay, beta-delayed nucleon emission, non conservation of parity	**Idem**	**Idem**
1.6	**Gamma decay**: energetic, classical EM radiation, quantum EM radiation, angular momentum and parity rules, angular distribution and polarization measurements, internal conversion, lifetimes, spectroscopy	**Idem**	**Idem**
1.7	**Nuclear Reactions:** types of reactions and conservation laws, energetic of nuclear reactions, isospin, reaction cross sections, experimental techniques, coulomb scattering, nuclear scattering, scattering and reaction cross sections, the optical model, compound-nucleus reactions, direct reactions, resonance reactions, heavy-ion reactions.	**Idem**	**Idem**
1.8	**Nuclear Astrophysics**: the hot big cosmology, particle and nuclear interactions in the early universe, primordial nucleosynthesis, stellar nucleosynthesis ($A \leq 60$), stellar nucleosynthesis ($A > 60$), nuclear cosmochronology.	**Idem**	**Idem**
2.0	**Cognitive Skills**		
2.1	**The understanding of nuclear model, nuclear radioactivity and reactions.**	**Homework assignments** **Problem solving.** **Case studies related to the course topics.**	**Major and final exams** **Checking the problems solved in the homework assignments.**
2.2	**Solve problems.**	**Idem**	**Idem**
3.0	**Interpersonal Skills & Responsibility**		

3.1	**Work independently and as part of a team.**	**Writing group reports Solving problems in groups.**	**Grading homework assignments**
3.2	**Manage resources, time and other members of the group**	**Idem**	**Idem**
3.3	**Communicate results of work to others**	**Idem**	**Idem**

4.0	**Communication, Information Technology, Numerical**		
4.1	**Use computational tools**	**Writing reports Incorporating the use and utilization of computer in the course requirements**	**None**
4.2	**Report writing**	**Idem**	**None**
5.0	**Psychomotor**		
5.1	**Not Applicable**	**None**	**None**

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**	**weekly**	**10%**
2	**Major exams I**	**6**	**20%**
3	**Major exams II**	**12**	**20%**
4	**Final exam**	**16**	**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) **Office hours 4 hr/week**

E Learning Resources

1. List Required Textbooks K.S. Krane 'Introductory nuclear physics', Wiley, 1987.
2. List Essential References Materials (Journals, Reports, etc.) **Reviews and Reports.**
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. **Websites on the internet that are relevant to the topics of the course**
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. **Multimedia associated with the text book and the relevant websites**

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**
2. Technology resources (AV, data show, Smart Board, software, etc.) **Computer room containing 5-10 working stations**
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **Equipment and illustration tools relevant to the course material**

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching **i- Course evaluation by student** **ii- Students- faculty meetings**
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department **i- Peer consultation on teaching** **ii- Departmental council discussions** **iii- Discussions within the group of faculty teaching the course**
3. Processes for Improvement of Teaching **i- Conducting workshops given by experts on the teaching and learning methodologies.** **ii- Periodical departmental revisions of its methods of teaching** **iii- Monitoring of teaching activates by senior faculty members**
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) **i-Providing samples of all kind of assessment in the departmental course portfolio of each course** **ii-Assigning group of faculty members teaching the same course to grade same questions for various students. Faculty from other institutions are invited to review the accuracy of the grading policy**
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. **i-The course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental and higher councils.** **ii-The head of department and faculty take the responsibility of implementing the proposed changes.**

Name of Course Instructor: ____Dr. Farouk Aksouh_____

Signature: _____ Date Specification Completed: __1/1/2018_

Program Coordinator: _____

Signature: _____ Date Received: _____