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

ATTACHMENT 5.

T6. COURSE SPECIFICATIONS (CS)

هيئة تقويم التعليم
Education Evaluation Commission

Course Specifications

Institution: **King Saud University**	Date: **11.02.2018**
College/Department : **College of Science/ Physics and Astronomy Dept.**	

A. Course Identification and General Information

1. Course title and code: **Nuclear Techniques – Phys 587**
2. Credit hours: **3(2+0+2)**
3. Program(s) in which the course is offered.
(If general elective available in many programs indicate this rather than list programs)
MSc in Physics (nuclear physics track)
4. Name of faculty member responsible for the course:
Dr. Khalid Kezzar
5. Level/year at which this course is offered:
3rd Level / 2nd Year
6. Pre-requisites for this course (if any):
Phys580
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?	**70%**
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other (Practical)	✓	What percentage?	**30%**

Comments:

B Objectives

1. What is the main purpose for this course?

- **Familiarize students with the techniques used in experimental nuclear and particle physics.**
- **Develop the students understanding on how to design, perform and analyze nuclear and particle physics experiments**

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)

- The course material and example codes for the laboratory part are provided.

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
Radiation Sources	**1**	**2**
Interaction of Radiation with Matter	**1**	**2**
Statistics and Measurements	**1**	**2**
General Features of Detectors	**1**	**2**
Ionization Chambers	**2**	**2**
Proportional Counters	**1**	**2**
Geiger-Mueller Counter	**1**	**2**
Scintillation Detectors	**2**	**4**
Photomultiplier Tubes	**2**	**4**
Spectroscopy with Scintillators	**1**	**2**
Semiconductor Diodes	**2**	**4**
Practical Part		
Data Analysis Techniques (ROOT)	**7**	**14**
Monte-Carlo Simulation (GEANT4)	**7**	**14**

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

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other:	Total
Contact Hours	Planed	30			30		60
	Actual	30			28		58
Credit	Planed	30			15		45
	Actual	30			14		44

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

6 hours weekly for the homework.

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

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;

The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

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	Laboratory competences: a. The ability to manipulate modern laboratory equipment. b. The ability to process and manipulate data to calculate quantities that will test a hypothesis. c. The ability to quantitatively assess errors in an experiment and from it to calculate the uncertainty of a derived result so as to determine the degree of agreement with published values. d. The ability to use computational and	Demonstrating the basic information and principles through lectures.	Reports

	graphical techniques to carry out the above tasks.		
1.2	problem-solving competences: a. Mathematical modeling of real world systems through idealizations and estimation, starting from fundamental physical principles. b. Using methods of checking solutions, including dimensional analysis, working symbolically, and checking limiting cases.	Discussing phenomena with illustrating pictures and diagrams.	Exams a) Quizzes b) Short exams (midterm exams) c) Long exams (final) d) Oral exams
1.3	Understanding of the content of the main areas in physics and astronomy.	Lecturing method: a) Blackboard b) Power point c) e-learning	Laboratory work
1.4	Computing skills: a. The ability to program a computer in at least one language at the level necessary to numerically model physical systems. b. The ability to use software to perform theoretical work involving symbolic and/or numerical evaluation. c. The ability to perform monte-carlo simulation of nuclear and particle physics experiments.	Tutorials: a) Revisit concepts b) Discussions c) Brain storming sessions	Discussions
		Dedicated laboratories to perform experiments related to each topic.	
2.0	**Cognitive Skills**		
2.1	Understanding of the subject.	Home work assignments	Asking about physical laws previously taught
2.2	Ability to apply physical laws and principles.	Preparing main outlines for teaching	Writing reports on selected parts of the course
2.3	Ability to identify problems and analyze phenomena.	Following some proofs	Discussions of how to simplify or analyze some phenomena

2.4	Ability to construct and realize experiments, and analyze the data.	Define duties for each chapter	Exams, short quizzes
2.5	Ability to perform theoretical calculation and analyze the data.		Performing experiments, analyzing and interpreting data.
3.0	**Interpersonal Skills & Responsibility**		
3.1	Able to perform experiments independently, as well as to describe, analyze and critically evaluate experimental data and to be familiar with the most important experimental methods	Learn how to solve difficulties in learning	Assignments and group work.
3.2	Understanding of the nature and methods of physics research and how it can be applied in other fields e.g. engineering	Solving problems	Presentation on reviewed articles.
3.3	Familiar with the culture of physics research, including the relation between experiment and theory.	Enhance educational skills	Performing experimental and theoretical projects
3.4	Able to find physical and technical information relevant to research work and technical project development using literature search methods.	Group activities and presentations.	
3.5	Able to work with a high degree of autonomy, accepting responsibility in planning and managing projects.		
3.6	Able to carry out professional activities in the area of applied technologies and industry.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicating with: 1- Peers 2- Lecturers 3- Community	For communication with peers a) Creating working groups. b) Report on small project. c) Essay writing. d) Solving problems.	Discussing reports and group work sheets

		e) Search on the internet for information.	
4.2	For IT: 1- Search on the internet 2- Computer skills 3- Use libraries 4- scientific forums	For communication with lecturers: Discuss difficulties.	Discussing visits and field trips
4.3	For Numerical skills: Computation Problem solving Data analysis and interpretation. Pointing out the physical reality of results		Written reports for the different aims
4.4	Students will be able to : 1. Conduct presentation independently in any given context. 2. Write review articles of undergraduate level. 3. Use IT resources and teaching learning context.		Oral discussions to evaluate the student ability in the desired skills
5.0	**Psychomotor**		
5.1	Present and explain his results in dedicated seminars.	Organize seminars for students to present and explain their results	Noticing the student activity during the seminars and in the laboratory.
5.2	Argue about physical phenomena with general public.	Organize public talks given by the students about hot topics in physics	

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	**Class activities and homework**	**weekly**	**10%**
2	**Midterm exams I**	**6**	**25%**
3	**Practical Exam (take-home)**	**12**	**25%**
4	**Final exam**	**16**	**40%**

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 h/week**

E Learning Resources

1. List Required Textbooks - **Radiation Detection and Measurements, Glenn. F. Knoll, 4th edition.** - **Techniques for Nuclear and Particle Physics Experiments, William R. Leo, 2nd edition.**
2. List Essential References Materials (Journals, Reports, etc.) - **Radiation Detection and Measurements, Glenn. F. Knoll, 4th edition.** - **Techniques for Nuclear and Particle Physics Experiments, William R. Leo, 2nd edition.**
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. **https://root.cern.ch/, http://geant4.web.cern.ch/**
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 with max 15 seats**
2. Technology resources (AV, data show, Smart Board, software, etc.) **Computer room containing at least 5 workstations**
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 - **Course evaluation by student** - **Students- faculty meetings**

2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department - **Peer review on teaching** - **Departmental council discussions**
3. Processes for Improvement of Teaching - **Conducting workshops given by experts on the teaching and learning Methodologies.** - **Periodical departmental revisions of its methods of teaching** - **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) - **Providing samples of all kind of assessment in the departmental course portfolio of each course** - **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** - **Conducting standard exams.**
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. - **The course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental council.** - **The department council take the responsibility of implementing the proposed changes.**

Name of Course Instructor: Dr. Khalid Kezzar

Signature:  Date specification completed: 11.02.2018

Program Coordinator: _____

Signature: _____ Date Received: _____