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	Date of Report
King Saud University	**01/01/2018**
College/Department	
Science/ Physics & Astronomy	

A. Course Identification and General Information

1. Course title and code: **Special Topics in Theoretical Physics PHYS 516**
2. Credit hours **03**
3. Program(s) in which the course is offered.
(If general elective available in many programs indicate this rather than list programs)
Ph.D.
4. Name of faculty member responsible for the course **Prof. Md. Harunor Rashid Khan**
5. Level/year at which this course is offered **Ph.D.**
6. Pre-requisites for this course (if any)
Fundamental knowledge in Particle Physics, High Energy Physics & Quantum Mechanics is necessary
7. Co-requisites for this course (if any): **Nothing**
8. Location if not on main campus : **Not Applicable**
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: **Nothing Special**

B Objectives

1. What is the main purpose for this course?

This course focuses mainly on the special topics on theoretical high energy and particle physics. High Energy Physics is the study of the most fundamental building blocks of nature. It is believed that during the early Big-bang the matter and antimatter have been created in equal amounts. But todays universe is totally matter dominant. Therefore question arises where the antimatters have gone. With the development of the modern accelerator facilities as well as modern computing technology the elementary particles can be produced and their species can be studied in the laboratory. Topics include the Higgs boson and the study of the properties of the neutrino with a focus on understanding the origin of mass and the observed matter asymmetry of the universe.

The main purpose of the present course is to have a latest idea of these particle species, their constituents forces, fields, interactions & their properties as well the creation of the universe.

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)

There are several ongoing experiments on high energy physics around the globe. New physics processes are evolving from these experiments. Therefore students can enhance their knowledge by visiting the websites of these experiments.
The important experiments are: LHC experiments at CERN, Belle II at KEK, Babar at SLAC etc.

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

Course Description:
This course focuses mainly on the special topics on the theoretical high energy and particle physics. It describes the latest status of Standard Model of High Energy Physics (HEP) and beyond, the standard electroweak model and Quantum Field Theory theory. This course also reflects to the Grand Unification theory and the discovery of the Higgs and its consequence and two Higgs Doublet Model in HEP. Finally it deals with the dark mater and black holes which will help to understand the missing of the antimatter as well as the big bang theory.
The selected topics of this course will help the students to have the updated knowledge on the main and advanced topics in HEP and will enhance their level to do research in high energy and particle physics.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
The Standard Model and Beyond	1	3
Standard Electroweak Model	1	3

Advanced Quantum Field Theory	1	3
Quark Mixing	1	3
Neutrino Oscillations	1	3
Extended GUT	2	6
Electroweak Symmetry Breaking	2	6
Higgs Model, Supersymmetry, Extra Dimension	2	6
Two Higgs Doublet Model	2	6
Dark Matters & Black Holes	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	03					03
	Actual	03					03

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.)

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Ass Metho
1.0	**Knowledge**		
1.1		In-class discussion	
1.2		In-class problems solving.	
1.3		Pop Quizzes.	

1.4		Homework assignments		
2.0	**Cognitive Skills**			
2.1		Discuss the duties for each chapter and homework assignments		
2.2		Problem solving.		
2.3		Quizzes.		
3.0	**Interpersonal Skills & Responsibility**			
3.1		Conducting group discussions and solving problems.		
3.2		Enhance educational skills.		
3.3		Encourage student attendance by giving bonus marks for attendance and by giving pop quizzes.		
3.4		Learn how to search the internet and use the library.		
4.0	**Communication, Information Technology, Numerical**			
4.1		Encourage group discussions during class and group problems solving.		
4.2				
5.0	**Psychomotor**			
5.1		**Not applicable**		
5.2				

5. 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	Mid Term Exam	9	20%
2	Assignment	6	20%
3	Home Work	3	20%
4	Final Examination	0	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) Approximately one hour per week if needed.

E Learning Resources

1. List Required Textbooks a. Particle Physics, B.R. Martin & G. Shaw, 3rd edition, Wiley b. Quarks & Leptons, F. Halzen & A.D. Martin, John Wiley &Sons. c. Introduction to High Energy Physics, D. H. Perkins
2. List Essential References Materials (Journals, Reports, etc.) The frequent search of the following journals will help to update the knowledge of the students: Progress in Particle and Nuclear Physics Physics Letters, Section B: Nuclear, Elementary Particle and High-Energy Physics Journal of High Energy Physics Advances in High Energy Physics High Energy Physics - Phenomenology (hep-ph) High Energy Physics - Experiment (hep-ex)
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.: The websites of LHC, Belle, Babar, CDF etc. may help to get the updated development of the course content.
4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. Nothing Speicial

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.) A normal Classroom.
2. Technology resources (AV, data show, Smart Board, software, etc.) Smart Board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Nothing Special

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
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)
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Faculty or Teaching Staff: Dr. Md. Harunor Rashid Khan

Signature:  **Date Report Completed: 01/01/2018**

Received by: _____ Dean/Department Head

Signature: _____ Date: _____