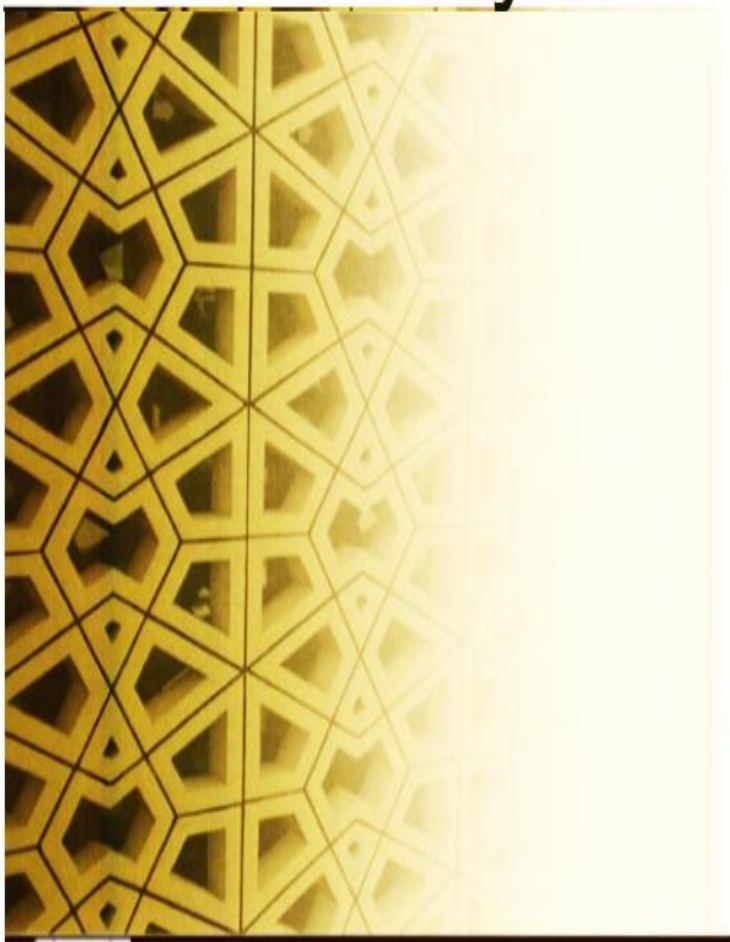
DEPARTMENT OF PHYSICS

Medical Physics



كلية العلوم التطبيقية
Faculty of Applied Sciences

Department of Physics

قسم الفيزياء

Umm Al-Qura University, 2017

Kingdom of Saudi Arabia

Ministry of Education

Umm Al-Qura University

College of Applied Science

Physics Department

Medical Physics Group

المملكة العربية السعودية

وزارة التعليم

جامعة ام القرى

كلية العلوم التطبيقية

قسم الفيزياء

B. Sc. Study Medical Physics Plan

Physics Department –College of Applied Science

Umm Al-Qura University

(Study Plan 1433 A.H)

B. Sc. Study Medical Physics plan
Physics Department –Faculty of Applied Science
Umm Al-Qura University

(Study Plan 1433 A.H)

Introduction:

The B.Sc program in the physics department in the Faculty of applied sciences aims at providing the students with the required knowledge for employment within and outside the university. The Faculty of applied science has been consistently carrying out the development of all its programs, including a foundation year for the admitted secondary school students.

This introduction gives a brief recapitulation of the history of the department, its goals, program requirements as well as the overall structure of the plan and the contents of the main courses and otherwise support courses. Renew of the two programs (Physics and Medical Physics programs) approval of the overall structure and department plans has been decided by the year 1436 H.

1. About the Department:

The Department of Physics has been established as part of the Faculty of science in the year 1401 H. under Faculty of applied sciences at that time, constituted four departments (mathematics, physics, chemistry, biology). The Department of Physics provide B.Sc. Degree of Physics and educational physics for a female and Male which has been upgraded later to join the masters and in 1403 H . A new Major of the Medical Physics was established within Physics department to provide female and male as medical physicist at the hospitals, research center and radiation protection , when the branch was integrated fully with the base department at the Faculty of applied Science in 1404H. At present, the department of physics is awarding, male and female students who has successfully completed 133 study units, the degree of Bachelors of Science in Physics and M.Sc. is awarded on separate programs. Also in medical physics male and female who successfully completed 135 study units awarded Degree in medical physics. Our planning programs in physic and medical physics for both (Male & Female) to introduce foundation year and to reduce the graduation credit hours for major physics to 133 Hr and medical physic to 135 Hr with some changes in physics courses to meet with high quality standard education.

2- Educational services:

The department provides male and female students who graduated from physics a master degree. The Department grants master's degrees to both male and female students in two distinct physics disciplines. These are:

1 - Nuclear Physics.
2 – Solid state Physics.
3- Light and Optics
4- Medical Physics

The department will soon grant a master's degree in the disciplines of M.Sc physics by courses (with a small project on final approval of the programs which have been submitted. Presently the department is awarding the M.Sc degree to male and female students only in Nuclear and light &optics and Solid state physics as well as Medical Physics . This will be followed by Master programs in Msc physics by courses and other departmental fields of interest in near future .

3- Objectives of the department:

A: The department is to graduate professionally qualified and for the employment requirements of the scientific and market needs, which is done through the programs of the Bachelor's degree who are proceeding for the employment at various government departments and other fields (hospitals); both within the university (as male and female demonstrators, male and female researchers, and male and female professional technicians) or outside the university for similar jobs. The areas of prospective jobs available for the graduates are a wide selection as follows:

1- Teaching at various schools of public education.
2- Engaging in research posts in specialized research centers in basic and applied research in physics (nuclear physics research - – Solid state research….etc).
3 - Jobs in industry (research and development) in the following areas:
- Manufacturing optical instruments and telecommunications.
- Manufacturing medical devices.
- Military services and industrialization.

4 - The management and operation of laboratories for measurements of atomic and nuclear radiations, and spectral analysis.
5 - Work in various sectors such as:
- King Abdulaziz City for Science and Technology (KACST) - Standards and Specifications Organization.
- Control of radioactive contamination in the Kingdom, Meteorological and environmental conditions, the monitoring of radiation dose evaluation at hospitals for services of personnel, patients, doctors and other exposed workers.

- Desalination.
6 - Military security sectors:
- Disclosure of fraud.
- Forensic examination.
- Control and detection of explosives
- Civil defense in protection and fire prevention
7 - Research laboratories:
- Research laboratories working at petroleum companies (e.g. Aramco)
- Basic-materials research laboratories (e.g. at SABIC)

B: Teaching physics courses that are required by various departments of the Facultys of Science, such as mathematics, chemistry and biology

Courses introduced by the department as service courses for male and female students of the university shown in the table above.
C: Providing post-graduate programs in physics (M.Sc.)
D: Providing the studies and the specialized physical research.
E: Providing the provision of specialized consultancy services to various destinations within and outside the University.
F: the service of society through various activities.

4. Human resources:

At the current time, the department has (30) academic faculty staff members in all disciplines of physics which includes 7 professors, 5 associate professors and 18 assistant professors. It also has 2 lecturers, 4 demonstrators, 10 technicians, and 6 lecturers and demonstrators having scholarships to complete their higher studies in USA and UK. The female section has seven faculty staff members which includes 9 assistant professors. It also has 7 lecturers, 14 demonstrators, and 5 technicians. Because of the limited number of the female faculty members, the male faculty members help teaching the graduate courses and some of the undergraduate courses at the female section.

Seven specialized research groups are found in the department and the faculty members are expected to join the research group according to their research interest. These groups are:
1 - Nuclear physics.
2- Solid state physics.
3- Medical Physics
4- Material Science and Nanotechnology.
5- Atomic and Molecular physics.

6- laser and optics.
7- Theoretical Physics.

Each experimental group has specialized research laboratories and undergraduate laboratories for teaching purposes.

5- Conditions for admission in the department:

The Faculty of applied Science requires the candidate to obtain a high school certificate (science section) in addition to the two examinations set by an independent testing education association (Qias). The acceptance grade is set by the Scientific Council of the Faculty. The candidate, after his/her initial acceptance, is expected to successfully pass the foundation year with a grade just pass.

6 - The name of degree:

The male or female student is awarded the Bachelor's of Science in Physics and the Bachelor's of Science in Medical physics upon the completion of the university and the department requires.

7- Courses coding:

Course codes and numbers are adopted in accordance with a specific methodology that takes into account the level of the curriculum and the sub-specialization, to which the course belongs to. This methodology has been applied to all the courses which the department has identified their symbols and subject.

The code, ***Phys***, refers to the name of scientific specialization, which belongs to the main content of the course (physics).
The percentage number: represents the annual level at which the course is offered. The decimal number: represents sub-specialization which the course belongs to. The unilateral number: represents a serial number of the course within its specialized group of courses.

For example, the digital symbol 461 indicates a course in the plan in the fourth year (level 8) belongs to a specialized subject with the code 6 (nuclear physics), and number 1, indicates that this is the first course in that group.

The modules of each course are given by a number indicating the total approved number of hours for the course followed by a bracket having three numbers separated by a plus sign. The first number indicates the approved

theoretical number of hours, the second indicates the approved laboratory number of hours of this course and the last number indicates the approved number of hours given for the exercises, which are presented in this course. Note that each approved credit hour allocated for the laboratory or the exercises is equivalent to two contact hours.

For example, the course Phys 101 (general physics) has a total approved modules of 4 hours. 3 hours for the theory (lectures), followed by lab of approved one-credit hour and has no laboratory. Its modules are written as 4 (3 + 0 +1).

Undergraduate Study Plan for Physics Department

In line with the policy of the university and its aspiration to modernize its study programs and the study plans to improve its levels, the Faculty of applied Science is undertaking the task of improving the programs of its departments. It has set a comprehensive and continuing review and evaluation program for the development of education in the light of the academic variability and the needs set by the job market. The plan is set to highlight the shortcomings, study deficiencies and imbalances in order to put appropriate solutions to these problems. The department has completed a comprehensive restructuring to its plan to take into account new developments and to meet the requirements of academic accreditation. This plan came as a result of this evaluation in the light of these developments.

- Restructuring of the study plan and the classification of courses:
- Designed study plan for students of the Faculty of Sciences is containing the basic aspects of knowledge in the following aspects:

1- Initial courses in the foundation year,
2- Islamic culture and Arabic language,
3- Specialization courses: these courses are given for the third semester to the eighth-semester. Specialized courses of the various physics branches (physics and medical physics with other supporting courses) as well as practical courses for the training of students to conduct physical experiments and to conclude results from the observed data are conducted. Most of these courses, 100%, will be provided in English accept Islamic culture, Arabic language and Holley Quran.

Such study plan for undergraduate studies in the Department of physics has been built to be, similar to that in other departments in the Faculty, 133 credit hours in physics and 135 credit hours for medical physics distributed over eight semesters as follows:

i- foundation year, two semesters of 30 credit hours after receiving a secondary education certificate (scientific section) and the general capacity test (measurement) for the scientific faculties.
ii- The remainder of the units distributed in six semesters with a total of 76 credit hours, of which:

A: University requirements (21 credit hours)
B: **Preparatory year requirements (30 credit hours)**
C: **Department's compulsory requirements (25 credit hours)**
D: Specialty requirements (46 credit hours)
E: Compulsory courses for Faculty science (13Hr)

The following table shows the detailed plan, approved by the department council at its 11th session on 10/2/1436 H.

Medical Physics Plan (1433 A.H.)

Table 1. Medical Physics plan courses

Requirements	No. of courses	Credit hours	Type	Actual hours
Preparatory year	8	30	Compulsory	30
University requirements	10	21	Compulsory	21
Faculty requirements	4	13	Compulsory	13
Dept.- requirements	8	25	Compulsory	25
Specialty requirements	14	41	Compulsory	41
Training project	1	5	Compulsory	5
Total	45	135		135

Medical Physics Plan

Table 2. Department of Physics compulsory required courses (46 credit hours)

	Course No.	Course Code 403	Course name	Credit hours
1	403280	Phys	Fundamental of Medical Physics	4(3+0+1)
2	403381	Phys	Laser in Medicine	2(2+0+0)
3	403383	Phys	Health Physics	3(3+0+0)
4	403384	Phys	Physics of Radiation Effects	2(2+0+0)
5	403385	Phys	Medical Radiation Physics (1)	4(3+0+1)
6	403386	Phys	Physics of Radiation Therapy (1)	4(3+0+1)
7	403388	Phys	Radiation Protection	2(2+0+0)
8	403389	Phys	Physics of Medical Imaging	3(3+0+0)
9	403390	Phys	Physics of Ultrasound In Medicine	2(2+0+0)
10	403391	Phys	Computer in Medicine	1(1+0+0)
11	403492	Phys	Medical Radiation Physics (2)	4(3+0+1)
12	403493	Phys	Physics of Radiation Therapy(2)	3(3+0+0)
13	403495	Phys	Nuclear Medicine	4(3+0+1)
14	403496	Phys	Physic of Bio-Material	3(3+0+0)

15	**403498**	**Phys**	**Training Project**	**5Hr**
			Total	**46Hr**

Table 3. Required courses (Compulsory) from other faculty departments

Course No.	Course Code	Course name	
401211	**Biol**	**Cell Biology**	**4(3+0+1)**
401102	**Biol**	**Biology I: zoology**	**2(2+0+0)**
402101	**Chem**	**General Chemistry**	**4(3+0+1)**
401364	**Biol**	**Animal Biology**	**3(3+0+0)**
Total			**13Hr**

Table 4. Required courses (Compulsory) from the department of Physics for Medical Physics program students

A: required courses from the department for the students as in following list of courses:

Prerequisite	Course No.	Course Code 403	Course name	Credit hours
4800130	**403200**	**Phys**	**General Physics-2**	**4(3+0+1)**
4800140	**403243**	**Phys**	**Method in Theatrical Physics (1)**	**2(2+0+0)**
403200	**403201**	**Phys**	**Electromagnetism (1)**	**3(3+0+0)**
403243	**403350**	**Phys**	**Modern Physics**	**4(3+0+1)**
403244	**403344**	**Phys**	**Quantum Mechanics (1)**	**3(3+0+0)**
403243	**403220**	**Phys**	**Classical Mechanics (1)**	**3(3+0+0)**
403243	**403244**	**Phys**	**Method in Theatrical Physics (2)**	**3(3+0+0)**
403344	**403370**	**Phys**	**Solid State Physics (1)**	**3(3+0+0)**
	Total			**25 credit hours**

Description of Medical Physics Plan 1433 A.H.

The student should successfully pass 135 credit hours before graduation. This can be achieved through eight semesters distributed on the following levels:

First and second levels (the foundation year):

Course No.	Course Code	Course name	Credit hours
Level 1 (Semester 1)			
4800170	Ngm	English (1)	6
4800140	Math	[Mathematics (1)] Introduction to Mathematics	4
4800130	Physics	General Physics	4(3+1+0)
4800150	Tec	Computer skills (1)	2
Level 2 (Semester 2)			
4800153	Tec	Basic Computer programming skills (2)	3
4800104	Nhg	Learning and studying skills	3
4800171	Ngm	English (2) Technical English skills	4
4800141	Math	[Mathematics (2)] Introduction to Mathematics	4
Total 30			

Level 3 (Semester 3)				
Course No.	Course Code 403	Prerequisite	Course name	Credit hours
403200	Phys	4800130	General Physics (2)	4(3+0+1)
403243	Phys	4800141	Method in Theatrical Physics (1)	2(2+0+0)
401211	Biol	–––––	Cell Biology	4(3+0+1)
401102	Biol	–––––	Biology I: Zology	2(2+0+0)
402101	Chem	–––––	General Chemistry	4(3+0+1)
601101	Slm	–––––	Islamic Culture (1)	2(2+0+0)
605101	Slm	–––––	Holly Quran (1)	2(2+0+0)
Total				20

Forth level:

Level 4 (Semester 4)				
Course No.	**Course Code**	**Prerequisite**	**Course name**	**Credit hours**
403280	**Phys**	**4800130**	**Fundamental of Medical Physics**	**4(3+0+1)**
403220	**Phys**	**403243**	**Classical Mechanics (1)**	**3(3+0+0)**
403244	**Phys**	**403243**	**Method in Theatrical Physics (2)**	**3(3+0+0)**
401364	**Biol**	**401102**	**Animal Biology**	**3(3+0+0)**
601201	**Slm**	**601101**	**Islamic Culture (2)**	**2**
605201	**Slm**	**605101**	**Holly Quran (2)**	**2**
Total				**17**

Fifth level:

Level 5 (Semester 5)				
Course No.	**Course Code**	**Prerequisite**	**Course name**	**Credit hours**
403381	**Phys**	**403280**	**Laser in Medicine**	**2(2+0+0)**
403383	**Phys**	**403280**	**Health Physics**	**3(3+0+0)**
403384	**Phys**	**403280**	**Physics of Radiation effects**	**2(2+0+0)**
403350	**Phys**	**403243**	**Modern Physics**	**4(3+0+1)**
601301	**Slm**	**601201**	**Islamic culture (3)**	**3**
403201	**Phys**	**403200**	**Electromagnetism (1)**	**3(3+0+0)**
605301	**Slm**	**605201**	**Holly Quran (3)**	**2**
501101	**Arb**		**Arabic language**	**2**
Total				**21**

Sixth level:

Level 6 (Semester 6)				
Course No.	**Course Code**	**Prerequisite**	**Course name**	**Credit hours**
403385	**Phys**	**403384**	**Medical radiation Physics (1)**	**4(3+0+1)**
403386	**Phys**	**403384**	**Physics of Radiation Therapy (1)**	**4(3+0+1)**
403388	**Phys**	**403384**	**Radiation Protection**	**2(2+0+0)**
403389	**Phys**	**403384**	**Physics of Medical Imaging**	**3(3+0+0)**
403390	**Phys**	**403383**	**Physics of Ultrasound in Medicine**	**2(2+0+0)**
403391	**Phys**	**403381**	**Computing in Medicine**	**1(1+0+0)**
403344	**Phys**	**403244**	**Quantum Mechanics (1)**	**3(3+0+0)**
601401	**Slm**	**601301**	**Islamic Culture (4)**	**2**
Total				**21**

Seventh level:

Level 7 (Semester 7)				
Course No.	**Course Code**	**Prerequisite**	**Course name**	**Credit hours**
403492	**Phys**	**403385**	**Medical Radiation Physics (2)**	**4(3+0+1)**
403493	**Phys**	**403386**	**Physics of Radiation Therapy (2)**	**3(3+0+0)**
403495	**Phys**	**403389**	**Nuclear Medicine**	**4(3+0+1)**
403496	**Phys**	**403389**	**Physic of Bio-material**	**3(3+0+0)**
403370	**Phys**	**403344**	**Solid State Physics (1)**	**3(3+0+0)**
102101	**ProH**		**Profit History**	**2**
605401	**Slm**	**605301**	**Holly Quran (4)**	**2**
Total				**21**

Eighth level:

Level 8 (Semester 8)				
Course No.	**Course Code**	**Prerequisite**	**Course name**	**Credit hours**
403498	**Phys**	**Dept. acceptance**	**Training project**	**5 Hr**
Total				**5**

Umm Al-Qura University

Date : 22-10-2015

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Degree Plans

major : 40301 Medical Physics

edition : 33

hours : 135

level 1

course code	course name	prerequisite	prerequisite course
4800140-4	Introduction to Mathematics 1		
4800150-2	Computer Skills1		
4800170-6	English Language		
4800130-4	General Physics(1)		

level 2

course code	course name	prerequisite	prerequisite course
4800141-4	Introducion to Maths(2)	4800140-4	Introduction to Mathematics 1
4800153-3	Basic Computer Programing Skills	4800150-2	Computer Skills1
4800104-3	learning and Study Skills		
4800171-4	Technical English Language	4800170-6	English Language

level 3

course code	course name	prerequisite	prerequisite course
403243-2	Method in theatrical Physics I	4800141-4	Introducion to Maths(2)
605101-2	The Holy Qur'aan I		
401102-2	Biology I: Zoology		
403200-4	General Physics II	4800130-4	General Physics(1)
402101-4	General Chemistry		
401211-4	Cell Biology		
601101-2	Islamic Culture I		

level 4

course code	course name	prerequisite	prerequisite course
403280-4	Fundamental of medical Physics	4800130-4	General Physics(1)
605201-2	The Holy Qur'aan II	605101-2	The Holy Qur'aan I
601201-2	Islamic Culture II		
403244-3	Method in theatrical Physics II	403243-2	Method in theatrical Physics I
403220-3	Classical Mechanics I	403243-2	Method in theatrical Physics I
401364-3	Animal Biology	401102-2	Biology I: Zoology

level 5

course code	course name	prerequisite	prerequisite course
403384-2	Physics of radiation effects	403280-4	Fundamental of medical Physics
403381-2	Laser in medicine	403280-4	Fundamental of medical Physics
403383-3	Health Physics	403280-4	Fundamental of medical Physics
605301-2	The Holy Qur'aan III	605201-2	The Holy Qur'aan II
601301-3	Islamic Culture III	601201-2	Islamic Culture II
403201-3	Electromagnetism	403200-4	General Physics II
501101-2	Arabic Language		
403350-4	Modern Physics	403243-2	Method in theatrical Physics I

level 6

course code	course name	prerequisite	prerequisite course
403389-3	Physics of medicaal imaging	403384-2	Physics of radiation effects
403344-3	Quantum Mechanics I	403244-3	Method in theatrical Physics II
403386-4	Physics of radiation therapy I	403384-2	Physics of radiation effects
403385-4	Medical radiation Physics I	403384-2	Physics of radiation effects
403390-2	Physics of Ultrasound in medicine	403383-3	Health Physics
403388-2	Radiation Protection	403384-2	Physics of radiation effects
403391-1	Computing in medicine	403381-2	Laser in medicine
601401-2	Islamic Culture IV		

level 7

course code	course name	prerequisite	prerequisite course
403495-4	Nuclear Medicine	403389-3	Physics of medicaal imaging
403492-4	Medical radiation Physics II	403385-4	Medical radiation Physics I
403493-3	Physics of radiation therapy II	403386-4	Physics of radiation therapy I
403496-3	Physic of Bio-material	403389-3	Physics of medicaal imaging
403370-3	Solid State Physics I	403344-3	Quantum Mechanics I
102101-2	The Biography of Prophet Muhammad (pbuh)		
605401-2	The Holy Qur'aan IV	605301-2	The Holy Qur'aan III

level 8

course code	course name	prerequisite	prerequisite course
403498-5	Training Project		

Learning outcomes of the program

Learning outcomes for B.Sc. program in Medical Physics is defined as follows:

a. Knowledge	**Summary description of the knowledge to be acquired and on completing this program students will be able to:** **a1. acquire the major aspects of nature and subject of medical physics and the application of physics to medicine.** **a2. recognize matter in various forms including crystals, semiconductors, atoms, nuclei and understand the principles of laser and its application in medicine.** **a3.use bioinformatics in order to know how to analysis data which is used to diagnose with the aid of different medical devices such as X- ray machines, gamma camera, accelerator and nuclear magnetic resonance.** **a4. define different quantitative, mathematical science and physical tools to analyze problems and list some foundations of systems theory to solve and analysis different problems.** **a5.understand the nature, properties, dosimetery of radiation and basics of radiation protection and also medical effects of ionizing and non-ionizing radiation.** **a6. know the principles of physics of different medical radiation devices and their modern advances, especially in medical radiation therapy and different applications in medical physics.**
b. Cognitive Skills	**Summary description of the Cognitive Skills to be acquired and on completing this program students will be able to:** **b1.apply mathematical and physical formulas and demonstrate skills of critical thinking and analytical reasoning to solve problems in medical physics and related fields of studies.** **b2. interpret the data obtained from testing diagnostic instruments such as MRI, X-rays, ultrasonic images, CT images and gamma camera images.** **b3. apply the mathematical expressions in evaluating and understanding of essential facts, concepts, principles and theories of medical physics.** **b4. formulate and test hypotheses using appropriate experimental design and analysis of data (Computer simulation) and integrate IT-based solutions into the user environment effectively.**
c. Interpersonal Skills and Responsibility	**Summary description of the Interpersonal Skills and Responsibility to be acquired and on completing this program students will be able to:** **c1. analyze and evaluate information by using computational tools to interpret experimental data relevant to medical physics by using packages from different theoretical and experimental resources, and perspectives.** **c2. operate some medical instrumentation such as that used for diagnosis of different diseases in medical centers and demonstrate competency in laboratory techniques and safety.** **c3. use scientific literature effectively and prepare technical reports that for individual student or making a group of research.** **c4. acquire ethical, social and legal responsibilities concerning Medical Physics.**
d. Communication, Information Technology and Numerical Skills	**Summary description of the Communication, Information Technology and Numerical Skills to be acquired and on completing this program students will be able to:** **d1. illustrate and employ the processes of scientific inquiry and research methods through use effectively information and communications technology (IT) tools and use the basic software, to ensure global understand of medical**

	physics issues. **d2. represent scientific concepts and analytical argument, in a clear and organized way, verbally and on writing.** **d3.implement all kinds of relevant information in medical physics through the use of local and internationally accessible libraries, information database, and electronic data and use that information in problem solving activities.** **d4. work independently and demonstrate the ability to manage time and to work as a part of a team, and learn independently with open– mindedness to learn how solve the daily life problems.**
e. Psychomotor Skills (if applicable)	NA

Course description for the undergraduate study plan 1433A.H. for the Physics Department (Physics + Medical Physics group Male/ Female section)

توصيف المقررات لمواد تخصص فيزياء بحته/فيزياء طبية

Level 3

403243-2 Method in Theoritical Physics1
605101-2 The Hooly Quraan I
401102-2 Biology I. Zoologygy
403200-4 General Physics II
402101-4 General Chimistry
401211-4 Cell Biology
601101-2 Islamic Culture I

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National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقويـم
والاعـتـمـاد الأكـاديـمـي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title: Theoretical Methods of Physics (1)

Course code: 404102

Prof. Dr. Khaled Abdel-Waged

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department: College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : Theoretical Methods of Physics (1) **2.** Course code: **403243-2**
2. Credit hours: 2
3. Program(s) in which the course is offered. : B.Sc Medical Physics
3. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: 3th level
6. Pre-requisites for this course (if any): 404102
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in these courses.

The objective of this course together with Phys. 242 and Phys 346 are to provide the student with the mathematics he needs for advanced undergraduate and beginning graduate study in physical science and to develop a strong background for those who will continue into the mathematics of advanced theoretical physics.

The benchmark statement of the main learning outcomes are to illustrate the relevance of mathematics to the Physical science. For example, the subject of differential equations in Phys. 240, 242 and 346 is dealt not with a series of trick solutions of abstract, relatively meaningless puzzles, but the solutions and general properties of the differential equations the student will most frequently encounter in a description of real physical world. Many of the physical examples used in these courses are taken from the fields of electromagnetic theory and Quantum Mechanics.

The overall goal is to show Mathematics as a useful and elegant tool for Physics.

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

The contents of Phys. 240, however, should be modified as follows:

The Chapter of the " **Second order linear differential equations"** should be inserted after the Chapter of **"Ordinary differential equations of the first order"** for completeness**.**

C. Course Description **(Note: General description in the form to be used for the Bulletin or Handbook should be attached)**

1 Topics to be Covered

Topic **Phys 240:**	No of Weeks	Contact hours
VECTOR ANALYSIS	4	12
CURVILINEAR COORDINATES	2	6
INFINITE SERIES, POWER SERIES	3	9
PARTIAL DIFFERENTIATION	3	9
ORDINARY DIFFERENTIAL EQUATIONS OF THE FIRST ORDER	3	9

2 Course components (total contact hours per semester):

PHYS 240 : 45 CONTAT HOURS PER SEMESTER

Lecture:	Tutorial:	Practical/Fieldwork/Internship:	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

4. Development of Learning Outcomes in Domains of Learning
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.

a. Knowledge

(i) Description of the knowledge to be acquired:

1- Learning fundamentals of Mathematical Physics
2- Understand how to use mathematics as a tool for physics
3- Ability to solve Physical problems
4- Improving the logical thinking

(ii) Teaching strategies to be used to develop that knowledge

1- Start each Chapter by general idea and the benefit of this Mathematical tool.

2-Solve some examples during the lecture.

3- Show the best ways to deal with the problem.

4- Keep the question "why" or "how" to explain always there.

5- Build a strategy to attack the problem.

6- Brain storming sessions.

(iii) Methods of assessment of knowledge acquired

1- Ask the student to clear the misunderstanding of some mathematical physical problem.

2- Exams:
   a) Quizzes
   b) Mid term exam 1
   c) Mid term exam 2
   d) Final exam

3- Always ask questions during the lecture.

b. Cognitive Skills

(i) Cognitive skills to be developed

1- How to use mathematics to understand physical problems

2- How to simplify mathematical problem

3-Ability to solve the physical problem with the mathematical tool in hand.

4- Analyse and explain natural physical problem.

5- Represent physical problem mathematically.

(ii) Teaching strategies to be used to develop these cognitive skills

1- Following some proofs.

2- Define duties for each chapter.

3- Homework assignments.

4- Encourage the student to look for the information in different sources.

5- Ask the student to do small research

(iii) Methods of assessment of students cognitive skills

1- Short quizzes, Midterm and final exams.

2- Ask about Mathematical laws previously taught.

3- Discussions of how to simplify or analyse physical problem.

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

The utmost goal is how to learn and work independently.

(ii) Teaching strategies to be used to develop these skills and abilities

1- Learn how to cover missed lectures.

2- Learn how to summarize lectures or to collect materials of the course.

3- Learn how to solve difficult problems-enhance educational skills.

4- Develop interest in science thought.

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

1- Quizzes on the previous lecture.

2- Discussion

3- Present required problems on definite time.

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

1- Problem Solving

2- Interpretation of the results

3- Feeling the Physical reality of the results

(ii) Teaching strategies to be used to develop these skills

1- Knowing the basic mathematical principles

2- Use the web for research

3- Frequent Exams to measure the Mathematical skills

4- Clear the weakest points

5- Encourage the student to ask for help

6- Focusing on some real results and its Physical meaning.

(iii) Methods of assessment of students numerical and communication skills 1- Exams and homework assignments should focus on the understanding 2- Their interaction with the lectures and discussions.
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required N. A
(ii) Teaching strategies to be used to develop these skills N. A
(iii) Methods of assessment of students psychomotor skills N. A

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5th week	15
2	Midterm 2	10th week	15
3	In- Class problem solving	12th week	5
4	Homework	Every week	5
5	Final Exam	End of semester	60

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

8 office hours per week

E Learning Resources

1. Required Text(s)
2. Essential References
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) 1- Mary L. Boas, Mathematical methods in the Physical sciences, second edition, John Wiley and Sons (1966) and (1983). 2- G. Dennis Zill, R. Michael Cullen, Advanced engineering mathematics, Jones and Bartlett Publisher (2006), ISBN 9780763745912. 3- Eugene Butkov, Mathematical Physics, World student series edition (1973).
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.)
2. Computing resources
3. Other resources (specify --eg. 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
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 (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

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Kingdom of Saudi Arabia

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COURSE SPECIFICATION

Course title: Biology 1 (Zoology)

Course code: 431102

Prof. Dr. Ahmed Yahia

Prof. Dr. Gamal Osman

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department: College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : Biology 1 (Zoology) 2. Course code: **403243-2**
2. Credit hours: 2
3. **Program(s) in which the course is offered. : B.Sc Medical Physics** 4. **The department is offering this course: Department of Biology**
5. **Name of faculty member responsible for the course:**
6. Level/year at which this course is offered: 3th level
7. Pre-requisites for this course (if any): 404102
8. Co-requisites for this course (if any): ---
9. Location if not on main campus: Main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

- **Identify the animal cell and its various forms.**
- **Study of internal organelles as they appear by electron microscope.**
- **Knowing the location, density and distribution of each of them in cell**
- **Focus on the functions of each organelle.**
- **Study the cell division.**
- **Structure, function and types of animal tissues**

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

- **Annual review of course by departmental course planning committee.**
- **Updating the course with latest developments in the field.**
- **Annual review and updating practical sessions with new slides and new preparations.**
- **Updating course resources using new information available in the internet.**
- **Comparison of course topics with equivalent local and international universities.**

C. Course Description **(Note: General description in the form to be used for the Bulletin or Handbook should be attached)**

1 Topics to be Covered

Topic	No of Weeks	Contact hours
Structure of animal cell	**1**	**1**
Structure and function of cell membrane and nucleus	**1**	**1**
Mitochondria, endoplasmic reticulum and golgi apparatus	**1**	**1**
Lysosomes and their roles in cell digestion	**1**	**1**
Centrosome, cilia and flagella	**1**	**1**
Peroxisomes and secretory vesicles	**1**	**1**
Introduction and different kind of animal tissues	**1**	**1**

Epithelial tissues and their functions	**1**	**1**
Connective tissues and their functions	**1**	**1**
Muscular tissues and their functions	**1**	**1**
Nervous tissues	**1**	**1**

2 Course components (total contact hours per semester):

Lecture: **13 weeks**	Tutorial: **14 credit hours: 12 actual hours**	Practical/Fieldwork/Internship: **Lab courses 36 actual hours (21.6 credit hours)**	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

4. Development of Learning Outcomes in Domains of Learning
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.

a. Knowledge

(i) Description of the knowledge to be acquired

- **Describe properties and structure of animal cell.**
- **Distinguish organelles under the microscope and write their scientific name**
- **Describe cell division.**
- **Recall and differentiate between different animal tissues.**

(ii) Teaching strategies to be used to develop that knowledge

- **In class lecturing (using PowerPoint and illustrations).**
- **Scientific and documentary films in some courses.**
- **Microscope examination**
- **Activities and homework.**

(iii) Methods of assessment of knowledge acquired

- **Mid-term and final exams**
- **Assessment of lab reports and examinations**
- **Evaluation of activities and homework.**

b. Cognitive Skills

(i) Cognitive skills to be developed

- **Examining and describing cells and cell organelles under the microscope.**
- **Distinguishing animal cells in different division stage of cell.**
- **Recognizing animal tissues under the microscope.**
- **Using computers and internet.**

(ii) Teaching strategies to be used to develop these cognitive skills

- **Use of microscopic illustrations.**
- **Training students on presentations and discussion**
- **Activities and homework.**

(iii) Methods of assessment of students cognitive skills

- **Students response during the class**
- **Evaluation of lab reports and examinations**
- **Evaluation of activities and homework.**

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- **Ability to work in a team to conduct a specific project.**
- **Ability to conduct a specific project with minimal supervision.**
- **Communicating results of work to others.**

(ii) Teaching strategies to be used to develop these skills and abilities

- **Work independently.**
- **Work as part of a team.**
- **Communicate results of work to others.**

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

- **Evaluation of group projects.**
- **Assessment of projects conducted individually.**

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

- **Ability to work in a team to conduct a specific project.**
- **Acquiring skills to use computers and internet.**
- **Training to conduct searches and restore information.**

(ii) Teaching strategies to be used to develop these skills

- **Promoting students to submit activities, assignments and writing reports.**

(iii) Methods of assessment of students numerical and communication skills

- **Evaluating the laboratory written reports**
- **Results of activities and assignments**

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

- **Enhance the ability to develop self-confidence and leadership among student**

(ii) Teaching strategies to be used to develop these skills

- **Encourage the student to explain presentations**

(iii) Methods of assessment of students psychomotor skills

- **Appreciation for the excellent student in front of the group.**

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment

1	**First theoretical exam**	**5**	**10%**
2	**Second theoretical exam**	**10**	**10%**
3	**Monthly Lab. Exam.**	**7**	**10%**
4	**Individual and collective activities**	**Weekly**	**10%**
5	**Final Lab. Exam.**	**14**	**20%**
6	**Final Exam.**	**15**	**40%**

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

- **Direct supervision by staff member over lab. Sessions and presentations**
- **Office hours 6 hr/ week**

E Learning Resources

1. Required Text(s)

Maisaa Mohammad Alrawi. (2014). Fundamental of cytology and histology.

2. Essential References

1- Campbell, N. A. and Reece, J. B. (2002). Biology (6th edition). Pearson Education. Inc. USA.
2- Brooker, R. J., Widmaier, E. P., Graham, L. E. and Stiling, P. D. (2008). Biology. McGraw-Hill International Edition.
3- Michael, H. R., Wojciech P. (2011). Histology, A Text and Atlas, 6th. Lippincott Williams and Wilkins. New York, London.

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

4-.Electronic Materials, Web Sites etc

www.biology.ucsc.edu

www.argene.com

www.columbia.edu **www.mindfully.org**
5- Other learning material such as computer-based programs/CD, professional standards/regulations • **Microsoft office package**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.) • **Modern lecture rooms.** • **Microscopically equipped laboratories.** • **The number of female students in the theory groups should not be more than 30 students.** • **The number of female students in the lab groups should not be more than 20 students.**
2. Computing resources • **Computer room containing at least 30 systems**
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) • **Dyed slides – screens – data show**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • **Distribution of questioners for course evaluation by students.** • **Students- faculty meetings.**
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department • **Peer consultation by departmental specialized committee.** • **Self-evaluation of the program by the departmental studying plan**
3 Processes for Improvement of Teaching • **Installation of modern microscopes** • **Implementation of suggestions by departmental specialized committee.**

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- **Reviewing assessments by staff member/chairman/special committee when required and instructed by higher administration at the end of each semester.**

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

- **Comparison of course with equivalent courses.**
- **Reviewing course topics annually by the departmental specialized committee.**
- **Refreshment of teaching resources to ensure updating of knowledge.**
- **Use of statistics for course evaluation by students to improve the course.**

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COURSE SPECIFICATION

Course title: General Physics (II)

Course code: 403200-4

Prof. Dr. Khaled Abdel-Waged

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department: College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : **General Physics (II)** 2. Course code: **403200-4**
2. Credit hours: 4
3. Program(s) in which the course is offered. : B.Sc Medical Physics **4. The department is offering this course: Department of Physics**
5. Name of faculty member responsible for the course:
6. Level/year at which this course is offered: 3^{h} level
7. Pre-requisites for this course (if any): 404102
8. Co-requisites for this course (if any): ---
9. Location if not on main campus: Main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The basic concepts of electricity and magnetism are taught in this course. Electrostatic, electric field, electric current and magnetic field are briefly covered. By the end of this course the student should have a reasonable understanding of electricity and magnetism, which represents the background of several other courses.
2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field) There is a plan to update all the experiments for this course.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
Electromagnetism, electric charge, conductors and insulators, Coulomb's law and conservation of charge	2	6
Electric field, charge distribution, point charges and electric dipoles	2	6
Electric flux, Gauss's law, charges in conductors and applications of Gauss's law	2	6
Electrostatic and gravitational forces, electric potential, electric potential energy, potential due to charge distributions and equipotential surfaces	2	6

Capacitance, capacitors in parallel and series, energy stored in capacitors, energy stored in electric fields, dielectrics and capacitors with dielectrics	2	6
Electric currents, current density, resistance and resistivity, Ohm's law and DC circuits (Kirchoff's laws and RC circuits)	2	6
Magnetic field, magnetic force, magnetic force and electric currents, Ampere's law and magnetic fields due to electric loops	2	6

2 Course components (total contact hours per semester):

Lecture: 42	*Tutorial: 14*	*Laboratory: 12*	*Practical/Field work/Internship*	*Other:*

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

4-6 hours/week for homework and lab reports

4. Development of Learning Outcomes in Domains of Learning

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.
a. Knowledge
(i) Description of the knowledge to be acquired : Basics of electricity and magnetism
(ii) Teaching strategies to be used to develop that knowledge • *Continuous evaluation by several quizzes and exams plus homework.* • *labs and online videos*
(iii) Methods of assessment of knowledge acquired • *Quizzes every other week, Mid-term exam, Final exam* • Lab reports (every week), Final lab exam • Discussions with the students
b. Cognitive Skills
(i) *Description of cognitive skills to be developed* • How to use physical laws and principles to understand the subject • How to simplify problems and analyse phenomena • Analyse and explain natural phenomena • Ability to explain the idea with the student own words • Represent the problems mathematically
(ii) *Teaching strategies to be used to develop these cognitive skills* • *Preparing main outlines for teaching* • Following some proofs • Define duties for each chapter • Homework assignments • Encourage the student to look for the information in different references • Ask the student to attend lectures for practice solving problem • Ask the student to do small research

(iii) Methods of assessment of students cognitive skills

- *Midterm´s exam, Exams, Short quizzes*
- Asking about physical laws previously taught
- Writing reports on selected parts of the course

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- *Work independently*
- *The students learn independently and take up responsibility*

(ii) Teaching strategies to be used to develop these skills and abilities

- *Learn how to search the internet and use the library*
- Learn how to cover missed lectures
- Learn how to summarize lectures or to collect materials of the course
- Learn how to solve difficulties in learning: solving problems-enhance educational skills.
- Develop her interest in science through: lab work, field trips,…
- Encourage the student to attend lectures regularly by giving bonus marks for attendance

(iii) *Methods of assessment of students interpersonal skills and capacity to carry responsibility*

- *Quizzes on the previous lecture*
- Discussion
- The accuracy of the result gained by each group will indicate good group work

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

- Problem solving
- Data analysis and interpretation
- Feeling physical reality of results
- Computation

(ii) Teaching strategies to be used to develop these skills

- Use the web for research
- Discuss with the student
- Exams to measure the mathematical skill
- Clear the weakness point that should be eliminated
- Encourage the student to ask for help if needed
- Computational analysis
- Data representation
- Focusing on some real results and its physical meaning
- Display the lecture note and homework assignment at the web

(iv) *Methods of assessment of students numerical and communication skills*

- *Their interaction with the lectures and discussions*
- The reports of different asked tasks
- Homework, problem solution assignment and exam should focus on the understanding
- Results of computations and analysis
- Comments on some resulting numbers
- Research

e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required
(ii) Teaching strategies to be used to develop these skills
(iii) Methods of assessment of students psychomotor skills

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Quizzes + homework	Every 2 weeks	10%
2	Lab reports	Every week	5%
3	Lab final exam	16^{th}	15%
4	Mid-term exam	8^{th}	30%
5	Final exam	17^{th}	40%

D. Student Support

1. Arrangements for availability of teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

During office hours (6 hours/week). In addition, students can arrange appointments with the lecturer whenever suits them.

E Learning Resources

1. Required Text(s) ; Physics, by J. Walker, fourth Ed.
2. Essential References :Fundamentals of Physics, by Halliday, Resnick and Walker
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) Introduction to Electrodynamics, by Griffiths
4-.Electronic Materials, Web Sites etc The lecturer prepared some solved exercise for each chapter, which are available on his personal website. Also, students are usually asked to watch some educational videos online about the subjects covered in the course.
5- Other learning material such as computer-based programs/CD, professional standards/regulations

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.) The maximum number of students in each group is 25, which can be conveniently accommodated in all class rooms and labs in the university.
2. Computing resources
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) A fully equipped lab for demonstrating and conducting experiments for students

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching Students are required to evaluate the course online (including the lecturer performance, the material .. etc) each semester. The student will not be able to receive his/her own final mark without this evaluation.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching The consideration of the students' comments and evaluations, plus the continuous update and

improvement of the course material
4. Processes for Verifying Standards of Student Achievement (eg. 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) Students have the right to ask for re-marking any exam in case there is any suspicion of the results.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. Continuous evaluation and consultation with the Faculty of Engineering to match their requirements.

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COURSE SPECIFICATION

Course title: Cell Biology

Course code: 403200-4

Prof. Dr. Ahmed Yahia

Prof. Dr. Gamal Osman

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department: College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : **Cell Biology** **2.** Course code: **401211 -4**
2. Credit hours: 4
3. Program(s) in which the course is offered. : B.Sc Medical Physics **4. The department is offering this course: Department of Biology**
5. Name of faculty member responsible for the course:
6. Level/year at which this course is offered: 3th level
7. Pre-requisites for this course (if any): 404102
8. Co-requisites for this course (if any): ---
9. Location if not on main campus: Main campus

B Objectives

The course aims at introducing the characteristics of the Kingdom of prokaryotes and through a detailed study of external structures and internal bacterial cell, and a brief study of the characteristics of the Kingdom of eukaryotes through a detailed study of external structures and internal eukaryotic cells with giving an overview of the foundations of cell division and the role of abnormal cells in causing cancer, and also an introduction to the study of stem cells and their most important uses in medical and therapeutic aspects.

C. Course Description **(Note: General description in the form to be used for the Bulletin or Handbook should be attached):**

This course aims to give the student an idea of prokaryotes and Eukaryotes

And the differences between them.

1 Topics to be Covered

Topic	No of Weeks	Contact hours
Historical introduction to cell biology and development that went through this science.	**1**	**1**
An overview of the taxonomic status of the bacteria within the living organisms. A brief description of the most important differences between bacteria and eukaryotic cells	**1**	**1**
(1) - Introduction to the external and internal structures of the bacterial cell and the functions of these structures	**1**	**1**
Gene cloning.	**1**	**1**
(2) - the exact installation of the cell, the cell wall installation the functions of the cell wall and the rest of the different organelles.	**1**	**1**
(3) - the exact composition of the plasma membrane and functions	**1**	**1**
(4) - ultrastructure eukaryotic cells	**2**	**2**
(6) - appendages poetic and precise composition and functions (7) - comparison between the appendages and flagella appendages noodles	**1**	**1**
(8) - the exact composition of bacterial cell cytoplasm and its contents	**1**	**1**
(9) - ultrastructure cytoplasm eukaryotic and its contents and the types of cell division in eukaryotic cells	**2**	**2**
(10) - Introduction to the cancer cells.	**2**	**2**
(11) - Introduction of stem cells and the most important uses.	**1**	**1**
	15	**15**

2 Course components (total contact hours per semester):

Lecture: 15	Tutorial:	Practical: 45	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

a. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course, the student
(1) - to identify the most important characteristics of the bacterial cell and the difference between them and the animal and plant cells.

(2) - the ability to understand the different functions the external and internal structures of the bacterial cell and the role of these structures to make the bacterial cell capable of causing disease, or spoilage of food or used in various industries

(3) - the ability to understand how cancer occurs.
(4) - to identify the stem cells and the most important medical and therapeutic uses.

(ii) Teaching strategies to be used to develop that knowledge

- Lectures which must start with preliminary one showing course contents
- Using images and movies
- Encouraging student to collect the new information about cells
- Enable the reference books and scientific sites concerning cancer cells in internet.

(iii) Methods of assessment of knowledge acquired:
Periodical exam and reports 10%
Mid- term theoretical exam 20%
Mid-term practical exam 5%
Final practical exam 15%
Final exam 50%

b. Cognitive Skills

(i) Cognitive skills to be developed

Having successfully completed the course students should be able to:
thinking and give information about the importance of cells in life
give information about the function of cells**.**
The differences between eukaryotic and prokaryotic cells

(ii) Teaching strategies to be used to develop these cognitive skills:

Through lectures, videos and some laboratory experiments which introduced to the students to enable them to understand the is the cell biology
Demonstrate the different types of cells.

(iii) Methods of assessment of students cognitive skills

Exam must contain questions that can measure these skills.

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

student should be able to obtain knowledge by himself from different sources
the student is encouraged to work in a team.

(ii) Teaching strategies to be used to develop these skills and abilities

- Open class discussions with students for minutes during lectures and labs.
- Students (as groups and individuals) should give reports concerning certain topics of the course.

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

Evaluate the efforts of each student in preparing the report.
Evaluate the scientific values of reports.

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

Enhancing the ability of students to use computers and internet.

(ii) Teaching strategies to be used to develop these skills

Homework (preparing a report on some topics related to the course depending on web sites).

(iii) Methods of assessment of students numerical and communication skills

Evaluation the efforts of students in preparing the reports and referring the references.

e. Psychomotor Skills (if applicable)

N. A

(ii) Teaching strategies to be used to develop these skills

N. A

(iii) Methods of assessment of students psychomotor skills

N. A

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Periodical Exam	4	5 %
2	Mid Term Exam (practical)	8	5 %
3	Mid Term Exam	9	20 %
4	Reports and essay	11	5 %
5	Final Practical Exam	15	15 %
6	Final Exam	16	50 %

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):
(1)- Mummery,C. Wilmut,L. Van de Stolpe,A. Roelen,B.A.J. (2011) Stem Cells Scientific Facts and Fiction. Academic Press.

-

(2)- Rastogi, S.C. (2005) Cell Biology 3th edition. New Age International Publishers.

Other learning material such as computer-based programs/CD, professional standards/regulations

PPT prepared by Prof. Dr. Ahmed Yahia and Prof. Dr. Gamal Osman

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)
Class room is already provided with data show
The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.
2. Computing resources
Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)
Availability of some reference
Availability new light microscopes
Availability different chemicals will be used for slides preparation

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching
Questionaries
Open discussion in the class room at the end of the lectures

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 movies.
Coupling the theoretical part with laboratory part
Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course: Prof. Dr. Ahmed Yahia and Prof. Dr. Gamal Osman

Signature
7/2/1437

LEVEL 4

403280-4 Fundamental of Medical Physics
605201-2 The Holy Quraan II
601201-2 Islamic Culture II
403244-3 Method in Theoretical Physics II
403220-3 Classical Mechanics I
401364-3 Animal Biology

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Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title: Fundamentals of Medical Physics

Course code: 403280-4

Prof. Dr. Saud Allehyani

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department: College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : **Fundamentals of Medical Physics** **2.** Course code: **403280-4**
2. Credit hours: 4
3. Program(s) in which the course is offered. : B.Sc Medical Physics **4. The department is offering this course: Department of Physics**
5. Name of faculty member responsible for the course:
6. Level/year at which this course is offered: 4th level
7. Pre-requisites for this course (if any): 404102
8. Co-requisites for this course (if any): ---
9. Location if not on main campus: Main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. **For students undertaking this course, the aims are to:** 1- study the motions of the living bodies as: static forces, friction, translational motion, angular motion. 2- define elasticity and strength of materials . 3- acquire basics of fluids, the motion of fluids and body fluid flow. 4- discuss the fundamentals of heat and life, kinetic theory and thermodynamics. 5- describe different types of waves, sound, electricity, electrical technology. 6- identify forces on bones and muscles, electrodynamics of nerve impulses, electrocardiograms, magnetocardiograms and magnetoencephalograms. 7- list different diffusion processes, membrane transport, kidney function. 8- describe different biological effects in magnetic resonance and ultra-low frequency electromagnetic radiation, radiation therapy, imaging. and laser applications.
2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field) 1-In the last two year we have developed this course by using interactive lab work showing most of the course lab in form of simulation (java) comparing the real measurements obtained in lab work with simulated measurements by java 2- using the library to search on some topics and writing reports.

C. Course Description **(Note: General description in the form to be used for the Bulletin or Handbook should be attached)**

1 Topics to be Covered :-		
Topics	No of Weeks (Studying Week No.)	Contact hours
Topics	**2 weeks (Week 1& 2)**	**6 hours**
1- PHYSICS OF HEAT AND BODY: - Body as a Heat Source - Conduction and Loss of Heat - Thermography - Medical Applications Solved problems, Quizzes and homework exercises		
Electricity and the Body:		
Electricity of Cell Membrane		

- Diffusion Equations	**2 weeks (Week 3 &4)**	**6 hours**
- Nernst Equation		
- Godlberg Equation		
Conduction in nerve Cells		
- Velocity of Conduction		
Solved problems, Quizzes and homework exercises		
3-Electric Conduction in Heart:	**2 weeks (Week 5 & 6)**	**6 hours**
- Electrophysiology of the Heart		
- Charge Distribution and propagation		
- ECG – Machine		
- Electrocardiograph Pulse		
Solved problems, Quizzes and homework exercises		
First Periodic Exam	**Week 7**	
MIDDLE TERM VACATION	**Week 8**	
4-Electricity and Medicine:	**1 week (Week 9)**	**3 hours**
- Defibrillation		
- High Frequency Electricity		
- Electromagnetic Effects		
Solved problems, Quizzes and homework exercises		
5- Light and Eye:	**1 week (Week 10)**	**3 hours**
- The Optics of the Eye		
- The Physiology of the Eye		
- Diffraction in the Eye		
- Light and Medicine		
Solved problems, Quizzes and homework exercises		
6- X-RAY IN MEDICINE:		

- physics of X-Ray	**2 weeks** **(Week 11& 12)**	**6 hours**
- Methods of Production		
- Medical Applications		
- Analysis of X-Ray Diffraction		
In Biological Molecules		
7- ESR	**1 week (Week 13)**	**3 hours**
- Theory and Applications		
8- NMR	**1 week (Week 14)**	**3 hours**
- Theory and Applications		
Second Periodic Exam	**(Week 15)**	
Final Practical Exam	**(Week 16)**	

2 Course components (total contact hours per semester):

Lecture: **28 hr**	Tutorial: **14 hr**	Practical/Fieldwork/Internship: **39 hr**	Other: Office hours : **32 hr**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

4. Development of Learning Outcomes in Domains of Learning
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.

a. Knowledge

knowledge that students should know and understand. ***At the end of the programme the student should be able to:***

a1- outline the fundamentals of medical physics.
a2- list the motions of the living bodies.
a3- define elasticity and strength of materials .
a4- acquire basics of fluids, the motion of fluids and body fluid flow.
a5- state the fundamentals of heat and life, kinetic theory and thermodynamics.
a6- describe different types of waves, sound, electricity, electrical technology.
a7- list forces on bones and muscles, electrodynamics of nerve impulses.
a8- name the basics of X-rays and its medical application, electrocardiograms, magnetocardiograms and magnetoencephalograms.
9- state different diffusion processes, membrane transport, kidney function.
10- describe different biological effects in magnetic resonance and ultra-low frequency electromagnetic radiation, radiation therapy, imaging. and laser applications.

(i) Teaching strategies to be used to develop that knowledge

The strategies used to develop the above knowledge are as follows:-

- *Brainstorming.*
- *Cooperative learning.*
- *Dialogue and discussion.*
- *Constructivist.*
- *Learning.*
- *Self-learning.*

(iii) Methods of assessment of knowledge acquired

- *Conducting scientific research and follow-up of advances in the field.*
- *Quarterly tests.*
- *By 15 minute multiple choice test on content on completion of each topic with results carrying 20% of final assessment.*
- *Duties and discussions within the lecture*
- *Multiple choice knowledge item on final exam.*

b. Cognitive Skills

Cognitive Skills that students should know and ***at the end of the programme the student should be able to:***

b1. estimate mathematical and physical formulas to solve problems in medical physics and related fields of studies
b2. interpret the data obtained from testing diagnostic instruments such as MRI and X-rays
b3. justify the mathematical expressions in evaluating and understanding of essential facts, concepts, principles and theories of medical physics.
b4. integrate information technology (IT) based solution into medical physics different fields effectively.

(ii) Teaching strategies to be used to develop these skills and abilities

- *Problem-solving strategy*
- *Cooperative learning strategy*
- *Strategy group discussions*

(iii) Methods of assessment of Cognitive Skills

- *Practical test*
- *Written test*
- *Individual and group activities*
- *Short cognitive tests.*

C. **interpersonal skills and responsibility**:

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed. ***At the end of the programme the student should be able to:***
***c1*. demonstrate data for electricity of cell membrane and membrane potential.**
***c2*–work in a group to conduct an experiment.**
***c3*– write a short report in specific subject related to the course materials by using advanced information and communication tools .**
***c4*– write a report individually or in a team using the library and the internet**
c5. justify the essential parts of a problem and formulate a strategy for solving the problem.
c6. evaluate the solution to a problem and apply appropriate techniques to arrive the solution.
c7. appraise the correctness of their solution, interpret their results and connect it to related areas of medical physics.
Throughout the course the student well have the capacity for self-directed learning, and personal and

social responsibility.

(ii) Teaching strategies to be used to develop these skills and abilities

Training students to build good relationships with their counterparts and collaborate with others and develop personal and professional performance through the following strategies:

- *cooperative learning*
- *peer education*

One group assignment in which 25% of assessment is based on individuals contribution to the group task. (Instructor meets with each group part way through project to discuss and advise on approach to the task . Two individual assignments requiring investigation using internet and library resources as a means of developing self -study skills. Role play exercise on controversial issue relevant to the course based on a case study, with discussion in tutorial of appropriate responses and consequences to individuals involved.

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

Assessment of group assignment includes component for individual contribution. Capacity for independent study assessed in individual assignments.

Students are assessed through:

- *evaluation of field activities*
- *verbal tests*
- *assessment assignments*
- *style note*

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain. ***At the end of the programme the student should be able to:***

d1. illustrate numeracy and computational skills, including such aspects as error analysis, order-of-magnitude estimations, and correct use of units and modes of data presentation.
d2. operate with basic software, such as word processing, spread sheet use, and graphic programmes, data-logging and storage.
d3. illustrate information and communications technology to act responsibly in personal and professional relationships.
d4. work independently and as a part of a team, and learn independently with open - mindedness and critical enquiry.
d5. demonstrate the ability to manage time, priorities workloads, and utilize long- and short-term planning skills.
d6. research scientific material and arguments clearly and correctly, in writing and orally, to a range of audiences.

d7. interpret human rights, civilian behaviour with others, knowing his duties and rights.
1- using internet to search for topics and writing reports

2- using some math program for some calculation

(ii) Teaching strategies to be used to develop these skills

- *Cooperative learning*
- *Self-learning to the global of information networks*
- *Medical Physics labs.*
- *Simulation programs.*
- *Hospital Training.*
- *Readymade programs.*
- *Smart Board*
- *Power point*

Student assignments require good standards of use of ICT. Where standards are inadequate the student is referred for special remedial instruction. Student essay assignments require proper style and referencing format as specified in college style manual

(iii) Methods of assessment of students numerical and communication skills

- *Written tests*
- *Laboratory tests*
- *Evaluate the information gathered by the students that are using information networks.*

Test questions require interpretation of simple statistical information. Assessments of students assignment and project work include expectation of adequate use of numerical and communication skills. Five percent of marks allocated for standard of presentation using ICT.

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

NA

(ii) Teaching strategies to be used to develop these skills

NA

(iii) Methods of assessment of students psychomotor skills

NA

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	**1st periodic exam**	**6**	**10%.**

2	**2nd periodic exam**	**13**	**10%.**
3	**Homework**	**1-15**	**5%**
4	**Essay**	**7-15**	**5%**
5	**Practical lab exam**	**16**	**20%**
6	**Final Examination**	**17**	**50%**
7	**Total**		**100%**

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Each student will supervised by by academic adviser in physics Department and the time table for academic advice were given to the student each semester.

E Learning Resources

1. Required Text(s)
2. Essential References
3- Recommended Books and Reference: **1-Paul Davidovits "Physics in Biology and Medicine" 3rd edi. Elsevier 2008.** **2-Russell K. Hobbie & Bradley J. Roth "Intermediate Physics for Medicine and Biology" Springer Science 2007.** **3- Raymond A. Serway - John W. Jewett "Physics for Scientists and Engineers" Thomson Brooks 2004.** **4-John R. Cameron & James G. Skofronick "Medical physics" Willy John 1988**
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.)
2. Computing resources
3. Other resources (specify --eg. 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
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 (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

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COURSE SPECIFICATION

Course title: Theoretical Methods of Physics (2)

Course code: 403280-4

Prof. Dr. Khaled Abdel-Waged

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department: College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : **Theoretical Methods of Physics (2)** 2. Course code: **403244-3**
2. Credit hours: 3
3. Program(s) in which the course is offered. : B.Sc Medical Physics **4. The department is offering this course: Department of Physics**
5. Name of faculty member responsible for the course:
6. Level/year at which this course is offered: 4th level
7. Pre-requisites for this course (if any): 403243-2
8. Co-requisites for this course (if any): ---
9. Location if not on main campus: Main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in these courses.

The objective of this course together with Phys 240 and Phys 346 are to provide the student with the mathematics he needs for advanced undergraduate and beginning graduate study in physical science and to develop a strong background for those who will continue into the mathematics of advanced theoretical physics.

The benchmark statement of the main learning outcomes are to illustrate the relevance of mathematics to the Physical science. For example, the subject of differential equations in Phys. 240, 242 and 346 is dealt not with a series of trick solutions of abstract, relatively meaningless puzzles, but the solutions and general properties of the differential equations the student will most frequently encounter in a description of real physical world. Many of the physical examples used in these courses are taken from the fields of electromagnetic theory and Quantum Mechanics.

The overall goal is to show Mathematics as a useful and elegant tool for Physics.

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

The contents of this course, however, should be modified as follows:

-The "**error function**" should be included in the topics, since it is used extensively in "Thermodynamics" and other physics courses.
- The "**Fourier transform**" should be added and given after "Fourier series", since it is used in "Quantum Mechanics (1)"
- The "**Dirac-Delta Function**" is missed in this course and should be added since it is used in many Physics courses, e.g., Quantum Mechanics, Electromagnetism 1 and 2 and others. This "Dirac Delta" function should be taught from the book of "Eugene Butkov, Mathematical Physics, World student series edition (1973)."

C. Course Description **(Note: General description in the form to be used for the Bulletin or Handbook should be attached)**

1 Topics to be Covered

Topic	No of Weeks	Contact hours
Phys 242:		
SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS	3	9
GAMMA AND BETA FUNCTIONS	2	6
DIFFERENTIAL EQUATIONS OF THE SPECIAL FUNCTIONS	7	21
FOURIER SERIES	3	9

2 Course components (total contact hours per semester):

PHYS 242 : 45 CONTACT HOURS PER SEMESTER

Lecture:	Tutorial:	Practical/Fieldwork/Internship:	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week)

4. Development of Learning Outcomes in Domains of Learning
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.

a. Knowledge

(i) Description of the knowledge to be acquired:

1- Learning fundamentals of Mathematical Physics
2- Understand how to use mathematics as a tool for physics
3- Ability to solve Physical problems
4- Improving the logical thinking

(ii) Teaching strategies to be used to develop that knowledge

1- Start each Chapter by general idea and the benefit of this Mathematical tool.

2-Solve some examples during the lecture.

3- Show the best ways to deal with the problem.

4- Keep the question "why" or "how" to explain always there.

5- Build a strategy to attack the problem.

6- Brain storming sessions.

(iii) Methods of assessment of knowledge acquired

4- Ask the student to clear the misunderstanding of some mathematical physical problem.

5- Exams:
   a) Quizzes
   b) Mid term exam 1
   c) Mid term exam 2
   d) Final exam

6- Always ask questions during the lecture.

b. Cognitive Skills

(i) Cognitive skills to be developed

1- How to use mathematics to understand physical problems

2- How to simplify mathematical problem

3-Ability to solve the physical problem with the mathematical tool in hand.

4- Analyse and explain natural physical problem.

5- Represent physical problem mathematically.

(ii) Teaching strategies to be used to develop these cognitive skills

6- Following some proofs.

7- Define duties for each chapter.

8- Homework assignments.

9- Encourage the student to look for the information in different sources.

10- Ask the student to do small research

(iii) Methods of assessment of students cognitive skills

4- Short quizzes, Midterm and final exams.

5- Ask about Mathematical laws previously taught.

6- Discussions of how to simplify or analyse physical problem.

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

The utmost goal is how to learn and work independently.

(ii) Teaching strategies to be used to develop these skills and abilities

5- Learn how to cover missed lectures.

6- Learn how to summarize lectures or to collect materials of the course.

7- Learn how to solve difficult problems-enhance educational skills.

8- Develop interest in science thought.

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

4- Quizzes on the previous lecture.

5- Discussion

6- Present required problems on definite time.

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

1- Problem Solving

2- Interpretation of the results

3- Feeling the Physical reality of the results

(ii) Teaching strategies to be used to develop these skills

7- Knowing the basic mathematical principles

8- Use the web for research

9- Frequent Exams to measure the Mathematical skills

10- Clear the weakest points

11- Encourage the student to ask for help

12- Focusing on some real results and its Physical meaning.

(iii) Methods of assessment of students numerical and communication skills 3- Exams and homework assignments should focus on the understanding 4- Their interaction with the lectures and discussions.
e. Psychomotor Skills (if applicable) **N. A**
(i) Description of the psychomotor skills to be developed and the level of performance required **N. A**
(ii) Teaching strategies to be used to develop these skills **N. A**
(iii) Methods of assessment of students psychomotor skills **N. A**

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5th week	15
2	Midterm 2	10th week	15
3	In- Class problem solving	12th week	5
4	Homework	Every week	5
5	Final Exam	End of semester	60

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

8 office hours per week

E Learning Resources

1. Required Text(s)
2. Essential References
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) 4- Mary L. Boas, Mathematical methods in the Physical sciences, second edition, John Wiley and Sons (1966) and (1983). 5- G. Dennis Zill, R. Michael Cullen, Advanced engineering mathematics, Jones and Bartlett Publisher (2006), ISBN 9780763745912. 6- Eugene Butkov, Mathematical Physics, World student series edition (1973).
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Lecture rooms, laboratories, etc.)
2. Computing resources
3. Other resources (specify --eg. 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
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 (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

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COURSE SPECIFICATION

Course title: Classical Mechanics I

Course code: 403220-3

Dr. Fatma Alsaid Mahros

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department: College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : Classical Mechanics I 2. Course code: **403220-3**
2. Credit hours: 3
3. Program(s) in which the course is offered. : B.Sc Medical Physics **4. The department is offering this course: Department of Physics**
5. Name of faculty member responsible for the course:
6. Level/year at which this course is offered: 4th level
7. Pre-requisites for this course (if any): 403243-2
8. Co-requisites for this course (if any): ---
9. Location if not on main campus: Main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

On successfully completing the course the students can be understand:

1. The basic concepts of all the way to valid conclusion and discuss the fundamental concepts in classical mechanics (1) through a broad range of interesting application to the real world.
2. Clearly and logically discuss the scalar, vector, gradient, divergence, curl, application of operator, vector integration, and derivative of a vector.
3. Analyze coordinates systems (curvilinear, differential vector operator, Cartesian, spherical and cylindrical) in physics
4. General motion of the particles in the three dimensions.
5. Discuss the noninertial reference systems.
6. Discuss the gravitation and central forces.

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

a) The first step in the development of the classical mechanics (I) was to examine the learning outcomes for the courses at the beginning of the semester
b) The second step was to categorize the subject matter and identify the important concepts. These concepts were identified from the outlines of the physical laws, principles and the associated proofs.
c) The third step is to identify the misconceptions that students are likely to have about each of the concepts in the complete list
d) The last step is highlighting the day life applications whenever exist and encourage the students to see more details in the international websites and reference books in the library, discussing some selected problems in each chapter, cooperate with a different institution to find how they deal with the subject

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered

Topic	No of Weeks	Contact hours
❖ **Fundamental Concepts: Vectors** • Introduction. • Vectors. • The Scalar Product. • The Vector Product. • Triple Products. • Derivative of a Vector. • Position Vector of a Particle: Velocity and Acceleration in Rectangular Coordinates. • Velocity and Acceleration in Plane Polar Coordinates. • Velocity and Acceleration in Cylindrical and Spherical Coordinates.	**2**	**6**

❖ **Newtonian Mechanics: Rectilinear Motion of a Particle** • Newton's Law of Motion. • Rectilinear Motion: Unifor Accerleration Under a Constant Force. • Forces that Depend on Position: The Concepts of Kinetic and Potential Energy. • Velocity-Dependent Forces: Fluid Resistance and Terminal Velocity.	**2**	**6**
❖ **Oscillations** • Linear Resoring Force: Harmonic Motion. • Energy Considerations in Harmonic Motion. • Damped Harmonic Motion. • Forced Harmonic Motion: Resonance.	**2**	**6**
❖ **General Motion of a Particle in Three Dimensions** • Introduction. • The Potential Energy Function n Three-Dimensional Motion: The Del Operator. • Forces of the Separable Type. • The Harmonic Oscillator in Two and Three Dimensions. • Constrained Motion of a particle.	**2**	**6**
❖ **Noninertial Reference Systems** • Accelerated Coordinate Systems and Interial Forces. • Rotating Coordinate Systems. • Dynamics of a Particle in a Rotating Coordinate System. • Effects of Earth's Rotation. • The Foucault Pendulum.	**3**	**9**
❖ **Gravitation and Central Forces** • Introduction. • Gravitational Force between a Uniform Sphere and a Particle. • Kepler's Laws of Planetary Motion. • Kepler's Second Law: Equal Areas. • Kepler's Firs Law: The Law of Ellipses. • Kepler's Third Law: The Harmonic Law. • Potential Energy in a Gravitational Field: Gravitational Potential. • Potential Energy in a General Central Field. • Energy Equation of an Orbit in a Central Field. • Orbital Energies in an Inverse-Squar Field.	**3**	**9**
	14 Week	**42 Hours**

2 Course components (total contact hours per semester):			
Lecture: 56	Tutorial:	Practical/Fieldwork /Internship:	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average: for the semester not a specific requirement in each week)

5 Office hours in each week to help students for solving assigned problems

4. Development of Learning Outcomes in Domains of Learning

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.

a. Knowledge

(i) Description of the knowledge to be acquired

1- Teaching strategies to be used to develop that knowledge
2- Learning fundamentals classical mechanics Theory
3- Understanding the physics of Classical Mechanics and their applications mentioned in the text.
4- Improving logical thinking.
5- To use mathematical formulation to describe the physical principle or phenomena
6- Ability to explain how things are working.
7- Teaching strategies to be used to develop that knowledge
8- Demonstrating the basic information and principles through lectures and the achieved applications
9- Discussing phenomena with illustrating pictures and diagrams
10- Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
11- Tutorials
12- Revisit concepts
13- Discussions
14- Brain storming sessions
15- Start each chapter by general idea and the benefit of it;
16- Learn the student background of the subject;
17- Show the best ways to deal with problem;
18- Keep the question "why" or "how" to explain always there
19- Build a strategy to solve problem.

(ii) Teaching strategies to be used to develop that knowledge

1- Solve some example during the lecture.
2- Exams**:**
    i. Quizzes
    ii. Short exams (midterm exams)
    iii. Long exams (final)
    iv. Oral exams
3- Discussions with the students.
4- Ask the student to clear the misunderstanding of some physical principle.
5- Ask quality question.

(iii) Methods of assessment of knowledge acquired

1. Solve some example during the lecture.
2. Exams**:**
   a) Quizzes
   b) Short exams (mid term exams)
   c) Long exams (final)
   d) Oral exams
3. Discussions with the students.
4. Ask the student to clear the misunderstanding of some physical principle.

Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

1. Ability to analyse the Vectors, divergence, Curl, Grad,
2. Studied the different coordinate systems.
3. Ability to understand the general equation of motion for the particle in three dimensions.
4. To understand the theoretical treatments of Classical Mechanics.
5. Understand the noninertial reference systems.
6. Knowing the central forces and celestial mechanics.
7. Studying the special relativity and some transformations.
8. Ask the student to do small research

(ii) Teaching strategies to be used to develop these cognitive skills

1. Preparing main outlines for teaching
2. Following some proofs
3. Define duties for each chapter
4. Home work assignments
5. Encourage the student to look for the information in different references
6. Ask the student to attend lectures for practice solving problem

Ask the student to do small research.

(iii) Methods of assessment of students cognitive skills

1. Midterm's exam. Exams, short quizzes
2. Asking about physical laws previously taught
3. Writing reports on selected parts of the course
4. Discussions of how to simplify or analyse some phenomena

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

1. Work independently.
2. The students learn independently and take up responsibility.

(ii) Teaching strategies to be used to develop these skills and abilities

1. Learn how to search the internet and use the library.
2. Learn how to cover missed lectures.
3. Learn how to summarize lectures or to collect materials of the course.
4. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
5. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.
6. Encourage the student to attend lectures regularly by:
    i. Giving bonus marks for attendance
    ii. Assigning marks for attendance.
7. Give students' tasks of duties

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

1. Quizzes on the previous lecture
2. Checking report on internet use and trips
3. Discussion
4. The accuracy of the result gained by each group will indicate good group work
5. Presenting the required research on time and the degree of the quality will show the sense of responsibility.

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

1. Computation
2. Problem solving
3. Data analysis and interpretation.

Feeling physical reality of results

(ii) Teaching strategies to be used to develop these skills

1. Know the basic mathematical principles.
2. Use the web for research.
3. Discuss with the student.
4. Exams to measure the mathematical skill.

5. Clear the weakness point that should be eliminated.
6. Encourage the student to ask for help if needed.
7. Computational analysis.
8. Data representation.
9. Focusing on some real results and its physical meaning.
10. Lectures for problem solution.
11. Encourage the student to ask good question to help solve the problem.

Display the lecture note and homework assignment at the web.

(iii) Methods of assessment of students numerical and communication skills

1. Their interaction with the lectures and discussions.
2. The reports of different asked tasks.
3. Homework, Problem solutions assignment and exam should focus on the understanding.
4. Results of computations and analysis.
5. Comments on some resulting numbers.
6. Research.

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required (NA)

(ii) Teaching strategies to be used to develop these skills (NA)

(iii) Methods of assessment of students psychomotor skills (NA)

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5th week	15
2	Midterm 2	10th week	15
3	In-Class Problem Solving	13th,7th week	10
4	Homework	Every week	10
5	Final exam	End of semester	50

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Each student will supervise by academic adviser in physics Department and the time table for academic advice were given to the student each semester.

E Learning Resources

1. Required Text (s)
   1. G. R. Fowles, and G. L. Cassiday, "Analytical Mechanics" (7th ed.), Brooks Cole. (2005).
   2. G. R. Fowles, "Analytical Mechanics" (3rd ed.), Holt, Rinehart and Winston (1977).

2. Essential References

   1. Thornton, Stephen T.; Marion, Jerry B.. Classical Dynamics of Particles and Systems (5th ed.). Brooks Cole. (2003)
   2. Kibble, Tom W. B.; Berkshire, Frank H. Classical Mechanics (5th ed.). Imperial College Press. (2004).

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

   1. Sussman, Gerald Jay & Wisdom, Jack & Mayer,Meinhard E. (2001). Structure and Interpretation of Classical Mechanics

4-.Electronic Materials, Web Sites etc

http://en.wikipedia.org/wiki/Classical_mechanics

http://math.ucr.edu/home/baez/classical/

5- Other learning material such as computer-based programs/CD, professional standards/regulations (NA)

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

   Lecture room for 30 student

2. Computing resources
   1. Computer room
   2. Scientific calculator.

3. Other resources (specify --eg. 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

1- 10 minutes Quiz per week

2- Home works

3- Term paper
4- Final Exam

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

1- At the end of term , Students fill an evaluation Sheet (without names)
2- Student Marks are analysed by considering Standard Deviation.

3 Processes for Improvement of Teaching

Strategies are modified each term according to the student feedback.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

In case of more than one section taken this course, the instructors are cooperated to give unified Exams and they use the same marks distribution for the answer sheet. Students can see their corrected sheet and compare it with key answer sheet.

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.
4- Add some subject and cut off others depending on the new discoveries in physics.

Level 5

403384-2 Physics of radiation effects
403381-2 Laser in Medicine
403383-3 Health Physics
605301-2 The Holy Quraan III
601301-3 Islamic Culture III
403201-3 Electromagnetism
501101-2 Arabic Language
403350-4 Modern Physics

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

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Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title RADIATION EFFECT

Course code: 403384-2

Prof. Saud Allehyani

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

6. Course title : RADIATION EFFECT **7.** Course code: 403384-2
2. Credit hours: 2 hrs
3. Program(s) in which the course is offered. : B.Sc Medical Physics
8. Name of faculty member responsible for the course: **Dr. Taha Alfawwal**
5. Level/year at which this course is offered: 5^{th} level
6. Pre-requisites for this course (if any): Fundamental of medical physics (403280-4)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

For students undertaking this course, the aims are to:
1-**acquire** basics of information of Dose–Response Characteristics and modification.
2-Study the Radiation Effects : Non Stochastic and Stochastic effects
3-Acquire Radiation-Weighted Dose Units: The Sievert and The Rem
4-**Understand** Water,Radiolysis
5- Compare between Direct and Indirect Action
6- acquire information about effect of ionizing radiation on DNA
7- **List** the différents route of radionucléides
8-Calculate the total effective doses from different sources and estimate the radiation risk..
9- List the difference between Radiation Biology of Normal and Neoplastic Tissue Systems
10- **describe** the mechanism of Radiation Carcinogenesis

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

Effects of ionizing radiations on living cells and organisms, including physical, chemical, and physiological bases of radiation cytotoxicity, mutagenicity, and carcinogenesis.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
Introduction to Radiobiology Biological Basis for Radiation Safety Dose–Response Characteristi	**Week (Week 1)**	3 hrs
Quantities and Units in Radiation Protection Radioactivity Exposure Absorbed dose Equivalent dose and effective dose Radiation-Weighted Dose Units: The Sievert and The Rem Problems	**Week (Week 2)**	3 hrs

Radiation Effects: Deterministic, Non Stochastic Acute radiation syndrome Hemopiotic Syndrome Gastrointestinal Syndrome Central nervous system Syndrome Other Acute Effects Birth Defects Treatment of Acute Overexposure Delayed Effects	**Week (Week 3)**	3 hrs
Radiation Effects: Stochastic Radiation Effects: Stochastic Leukemia Bone cancer Lung Cancer	**Week (Week 4)**	3 hrs
Direct and Indirect Action **Indirect Action of X-ray** **primary photon interactions:-** **Photoelectric effect** **Compton effect** **Pair production** **Primary Products of Radiolysis**	**Week (Week 5)**	
Radiation Chemistry of Water Primary Products of Radiolysis	**Week** ***(Week 6)***	
First Periodic Exam	**Week** (Week 7)	
Middle Term Vacation	**Week** (Week 8)	
Direct Action Normal structure of DNA molecule Affect of ionizing radiation on DNA molecule Biological Effective of radiation	**Week** ***(Week 9)***	**3 hrs**
Target theory Effect of Radiation on Living systems Effect at the molecular Level Effects at the Cellular Level Effects at the Organism Level	**Week** ***(Week 10)***	3 hrs
Radio protectors and radio sensitizers **Hormesis principle** Minimizing the random effect of free radicals.	**Week** (Week 11)	3 hrs

Evidence for DNA as the Target Molecule Macromolecular Target in the Cell	**Week Week 12)**(	3 hrs
Radiation Biology of Normal and Neoplastic Tissue Systems	**Week Week 13)**(	3 hrs
Radiation Carcinogenesis due to Low level occupational exposure Atomic Bomb survivors in Hiroshima and Nagasaki Medical radiation exposure to patients	**Week (week 14)**	3 hrs
Second Periodic Exam .	**(week) (week 15)**	
Final Practical Exam.	**(week) (week 16))**	

2 Course components (total contact hours per semester):			
Lecture 30 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **20hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

a. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:
1-Outline about Radiobiology and Biological Basis for Radiation Safety
2-Acquire the Dose Response Characteristics
3-Acquire the Radiation Effects: Deterministic. Stochastic
4- state Radiation-Weighted Dose Units: The Sievert and The Rem
5- Acquire knowledge about application of radiation effect on fractionation a dose in radiotherapy
6- Estimate the effective dose and radiation risk .
7- List different sources of radiation carcinogenices

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important medical physics in different medical applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

(i) Cognitive skills to be developed

B1. estimate mathematical and physical formulas to solve problems in medical physics and related fields of studies

B2 Justify the way of radiation carcinogenesis .

B3.integrate information technology (IT) based solution into radiation dose measurements in environment and medicine.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(i) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

1. Enhancing the ability of students to use computers and internet.
2. Interpret image pre-processing data
3. Use effectively image processing package to enhance the obtained image.
4. Know how to write a report.

5. Teaching strategies to be used to develop these skills

1. Homework (preparing a report on some topics related to the course depending on web sites).
2. Seminars presentation
3. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

1. Evaluation of presentations

2. Evaluation of reports

3. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

NA

(ii) Teaching strategies to be used to develop these skills

NA

4. **Methods of assessment of students psychomotor skills**

NA

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	11th week	15%
5	Assay	15th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

1- Edward L. Alpen "Radiation biophysics" academic press1998

2- Herman Cember and Thomas E. Johnson "introduction to Health Physics" 4th edi. McGraw-Hill 2009

3- Smith F A "A primer in applied radiation physics" by World Scientific Publishing 2000

Electronic Materials, Web Sites

(eg. Web Sites, Social Media, Blackboard, etc.)

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- After the agreement of Department and Faculty administrations

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

- Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff:	**Signature:**
Dr. Taha Alfawwal	

Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

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Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title **Physics of Laser in medicine**,

Course code: **403281**

Prof. Saud Allehyani

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

Course title : Physics of Laser in medicine,
9. Course code: **403281**
2. Credit hours: 2 hrs
3. Program(s) in which the course is offered. : B.Sc Medical Physics
10. Name of faculty member responsible for the course: Assoc. Prof. Mohamed M.Sabry
5. Level/year at which this course is offered: 5th level
6. Pre-requisites for this course (if any): Fundamental of medical physics (/ Code: 480280
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

For students undertaking this course, the aims are to:
Study of Laser formation from 2, 3 and 4-level laser

1. Study of the optical cavity conditions for Laser formation
2. Study of some real Laser system like CO_2 , He-Ne, Semiconductor, Ruby Lasers
3. Laser Safety and Laser transportation

Applications of Laser on Ophthalmological surgery.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

The purpose of this subject, with chapters from a group of new references, was to try to set down the physical basics of laser and its interaction with tissue and describe how these basics have been applied in some of the medical specialties. The student need to know basic principles from physical science to understand the construction and types of laser, opportunities and limitations of lasers, there are many areas in medical science where lasers or modern optics might have application if physical scientists knew about them and could transfer their knowledge to the medical area.
The topics also include the optical and thermal response of tissue to laser radiation, Tissue Diagnostics Using Lasers, Therapeutic and Diagnostic Application of Lasers in Ophthalmology, Cardiovascular Applications of Lasers, and Lasers in Photodynamic Therapy.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1 Topics to be Covered :-		
Topics	**No of Weeks (Studying Week No.)**	**Contact hours**
1- General Introduction	**2 weeks**	**4 hrs**
2- Introduction to Laser	**2weeks**	**4hrs**
First Periodic Exam		
3- Types of lasers	**2 weeks**	**4 hrs**
Mid Term Vacation		
4- Laser Safety, Damage and Transmission	**2 weeks**	**4 hrs**
5- Optical and Thermal Response of Tissue to Laser Radiation	**2 weeks**	**4 hrs**
Second Periodic Exam		
6- Lasers in Ophthalmology	**2 weeks**	**4 hrs**
Final Practical Exam		

2 Course components (total contact hours per semester):			
Lecture 24 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **6hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

b. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:

- 1 fundamentals of Laser physics.
- Distinguishing between the different Lasers for the point of view of their importance, danger, and power.

Gain some knowledge about the uses of Laser in Medicine in surgeries.

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important medical physics in different medical applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

- B1. (estimate mathematical and physical formulas to interpreting the formation and stability of Laser

  B2. integrate phys. information with that of medical and biological into medical physics

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(ii) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(ii) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

6. Enhancing the ability of students to use computers and internet.
7. Interpret image pre-processing data
8. Use effectively image processing package to enhance the obtained image.
9. Know how to write a report.

10. Teaching strategies to be used to develop these skills

5. Homework (preparing a report on some topics related to the course depending on web sites).
6. Seminars presentation
7. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

4. Evaluation of presentations

5. Evaluation of reports

6. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

NA

(ii) Teaching strategies to be used to develop these skills

- Follow up students the students in lab and during carryout all microbiological techniques

8. **Methods of assessment of students psychomotor skills**

- Giving additional marks for preparing correct media, bacterial slides , good seminar presentation
- Practical exam.

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	11th week	15%
5	Assay	15th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

2. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List
Laser Physics and Applications
Sub volume A: Laser Fundamentals - Part 1
Editors: H. Weber, G. Herziger, R. Poprawe
Authors:
H.J. Eichler, B. Eppich, J. Fischer, R. Güther, G.G. Gurzadyan,
A. Hermerschmidt, A. Laubereau, V.A. Lopota, O. Mehl, C.R. Vidal,
H. Weber, B. Wende—.

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2. List Essential References Materials (Journals, Reports, etc.).

LASERS IN MEDICINE
Edited by
Ronald W. Waynant
CRC PRESS
Boca Raton London New York Washington, D.C.

2. List Essential References Materials (Journals, Reports, etc.).

Electronic Materials, Web Sites
(eg. Web Sites, Social Media, Blackboard, etc.)

- http :// www.springer.com
- http:// www.sciencedirect.com

http:// www.gigabedia .org

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- After the agreement of Department and Faculty administrations

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

- Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Assoc. Prof. Mohamed M.Sabry	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair	**Signature:**

Dr. Hatem Alomri	
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

نماذج من الاختبارات الدورية والنصفية والنهائية

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـة الوطنيـة للتقويـم
والاعـتـمـاد الأكـاديـمـي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title HEALTH PHYSICS ,

Course code: 3-403383

Prof. Saud Allehyani

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

11. Course title : HEALTH PHYSICS 12. Course code: 3-403383
2. Credit hours: 3 hrs
3. Program(s) in which the course is offered. : B.Sc Medical Physics
13. Name of faculty member responsible for the course: **Dr. Taha Alfawwal**
5. Level/year at which this course is offered: 5^{th} level
6. Pre-requisites for this course (if any): Fundamental of medical physics (403280-4)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

After completing this course student should be able to:

1- Understand the basic concepts of of different medical instrumentations
2-Study Various types of health physics instrumentation
3- List types of transducers and applications
4-Acquire the radioactive decay processes for different ionizing radiation
5-**Describes the way of** waste disposal
6- Understand basic physical principles underlying X-ray shielding.,
7- List the difference between Tests &Accident (Chernobyl Accident ,The Goiania Radiation Incident).
8- **describe** the biological effects of low levels of ionizing radiation

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

Health physics course cover the following subjects:
Concepts of medical instrumentation, transducers, and medical electronics design. Various types of sensors and measurement apparatus used for the calibration of medical imaging and therapy systems will receive particular attention. Physical and biological aspects of the use of ionizing radiation in industrial and academic institutions; physical principles underlying shielding instrumentation, waste disposal; biological effects of low levels of ionizing radiation Nuclear Tests &Accident (Chernobyl Accident ,The Goiania Radiation Incident).

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
Concepts of medical instrumentation	**(Week 1,2 and 3)**	9 hrs
different types of health physics instrumentation	**Week (Week 4 and 5)**	6 hrs
Concepts of transducers, and Various types of transducer and application	**Week (Week 6)**	6 hrs
First Periodic Exam	**Week** (Week 7)	3 hrs
Middle Term Vacation	**Week** (Week 8)	3 hrs
Radioactive Decay Processes for different ionizing radiation	**Week (Week 9)**	3 hrs

Radiation and Environment Types of radioactive waste Nuclear Waste disposal	**Week (Week 10)**	3 hrs
biological effects of low levels of ionizing radiation	**Week (Week 11)**	3 hrs
Physical principles underlying shielding instrumentation X-ray shielding for radiograph and cardiac rooms.	**Week (Week 12)**	3 hrs
Nuclear Tests	**Week *(Week13)***	3 hrs
Accident and incident (Chernobyl Accident ,The Goiania Radiation Incident).	**Week Week 14)**(	3 hrs
Second Periodic Exam .	**(week) (week 15)**	
Final Semester Exam.	**(week) (week 16))**	

2 Course components (total contact hours per semester):			
Lecture: **45** (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: 20

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

c. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:
a1-. Understand concepts of medical instrumentation
a2- Acquire the various type of sensors and different health physics instruments.
a3- state the radioactive decay processes for different ionizing radiation
a4-- Acquire knowledge about Accident and incident
a5. Use mathematical formulation to calculate the X-ray shielding

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important microorganisms in different applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

(i) Cognitive skills to be developed

Having successfully completed the course students should be able to:
.**Estimate physical parameters to design Shielding for X-ray room.**
Integrate information technology (IT) based solution into radiation dose measurements in environment and medicine.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(iii) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(iii) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

11. Enhancing the ability of students to use computers and internet.
12. Interpret image pre-processing data
13. Use effectively image processing package to enhance the obtained image.
14. Know how to write a report.

15. Teaching strategies to be used to develop these skills

9. Homework (preparing a report on some topics related to the course depending on web sites).
10. Seminars presentation
11. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

7. Evaluation of presentations
8. Evaluation of reports
9. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

NA

(ii) Teaching strategies to be used to develop these skills

- Follow up students the students in lab and during carryout all microbiological techniques

12. **Methods of assessment of students psychomotor skills**

- N.A

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	11th week	15%
5	Assay	15th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

3. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

1- Herman Cember and Thomas E. Johnson "introduction to Health Physics" 4th edi. McGraw-Hill 2009
2- Joseph Magill & Jean Galy "Radioactivity · Radionuclides · Radiation" Springer 2005

Electronic Materials, Web Sites

(eg. Web Sites, Social Media, Blackboard, etc.)

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Taha Alfawwal	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title Electromagnetism

Course code: 403201-3

Revised Safar 1436 H

Revised September 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: UMM AL – QURA UNIVERSITY
College/Department : Faculty of Applied Science – Department of Physics

A Course Identification and General Information

14. Course title: Electromagnetism I **15. Course code: 403332-3**
2. Credit hours: 3hrs
3. Program(s) in which the course is offered. : B.Sc. Pure Physics
16. Name of faculty member responsible for the course: **Prof. Dr . Roshdi Seoudi (rsawed@uqu.edu.sa)** **Dr. Mongi Ben Moussa (msbenmoussa@uqu.edu.sa)** **Dr. Said Attia (smattia@uqu.edu.sa)**
5. Level/year at which this course is offered: 3nd Year / Level 5
6. Pre-requisites for this course (if any): Theoretical Methods in Physics (2) (403342-4)
7. Co-requisites for this course (if any): Theoretical Methods in Physics (1) (403241-4)
8. Location if not on main campus: Main Campus & El-Zaher Campus

B Objectives

After completing this course student should be able to:

1. Define the basic fundamentals of electromagnetic phenomena.
2. Using the mathematics to solve the problems in electromagnetism.
3. Using the mathematics to express the phenomena in electromagnerism.
4. Define the electric field, the electric potential, and electric dipole, .
5. Calculate the electrostatic field, electrostatic potential of the charge, dipole and multipoles
6. Apply the Gauss law to solve some problems.
7. Apply Poisson's equation to solve some problems
8. Apply Laplace's equation to solve some problems.
9. Define the electric displacement, polarization of the materials, dielectric constant, and electric susceptibility.
10. Calculate the electric field outside a dielectric materials.
11. Calculate the electrostatic field and potential in dielectric materials, microscopic theory of dielectric and electrostatic energy
12. Define the Ferroelectricity phenomena.
13. Calculate the energy density of the electrostatic field.
14. Calculate the energy of a System of Charged Conductors
15. Describe, in words, the ways in which various concepts in electromagnetism come into play in particular situations; to represent these electromagnetic phenomena and fields mathematically in those situations; and to predict outcomes in other similar situations.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

This course deals primarily with a vector calculus based description of static electric field in case of fixed charges, volume and surface charge distribution, dipole, multipole, conductor and dielectric beside the calculation of the electrostatic potentials in each case. Description the calculation of the electric field by applying Gauss's law for the fixed charge and dielectric materials. Also, it concern to the study of the polarization and dielectric constant and the boundary conditions at the interface at the two different dielectric medium. The calculation of the molecular field , electrostatic energy and descriptions of moving charges for the case of steady electric currents are also presented.

1. Describe the vector and scalar fields, Cartesian, spherical polar, cylindrical coordinates, integral vector calculus , div, grad, and curl operations with geometric interpretations, stokes and gauss theorems, Dirac delta function

Topics to be Covered		
Topics	**No of weeks**	**Contact Hours**
Vector Field	**1.5 week**	**4.5**
1- Vector and scalar fields **2-** Cartesian, spherical polar, cylindrical coordinates, integral vector calculus **3-** Div, grad, and curl operations with geometric interpretations 4- Stokes and gauss theorems, Dirac delta function		
Electrostatics	**2 weeks**	**6 hrs**
1-Electric Charge 2-Coulomb 3-The Electric Field 4-Electrostatic Potential 5-Conductors & Insulators 6-Gauss's Law 7-The Electric Dipole 8-Multipole Expansion		
Solution of the Electrostatic Problem	**4 weeks**	**12 hrs**
1-Poisson's Equation 2-Laplace's Equation 3-Laplaces's Equation in one Independent Variable 4-Laplace's Equation in Spherical Coordinates 5-Conducting Sphere in Uniform 6-Cylindrical Harmonics 7-Electrostatic Images 8-Point charge & Conducting Sphere		

9-Line charges & Line Images 10-System of Conductors 11-Poisson's Equation		
The Electrostatic Field in Dielectric Media	**3 weeks**	**9 hrs**
1-Polarization 2-Field Outside of a Dielectric Medium 3-The Electric Field Inside a Dielectric 4-The Electric Displacement 5-Electric Susceptibility and Dielectric Constant 6-Point Charge in a Dielectric Field 7-Boundary Conditions on the Field Vector 8-Boundary Value Problem Involving Dielectrics 9-Dielectric Sphere in a Uniform Electric Field		
MICROSCOPIC THEORY OF DIELECTRICS	**2 weeks**	**6 hrs**
1-Molecular Field in Dielectric 2-Induced Dipoles 3-Polar Molecules 4-Ferroelectricity		
ELECTROSTATIC ENERGY	**1.5 weeks**	**4.5 hrs**
1-Potential Energy of a Group of Point Charges 2-Energy Density of an Electrostatic Field		

3-Energy of a System of Charged Conductors 4-Capacitors		
	14 weeks	**42hrs**

2 Course components (total contact hours per semester):			
Lecture : 42 hrs	**Tutorial: 28 hrs**	**Practical: 42**	**Other: Homework 42 hrs**

17. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week):

28 h (reports and project research for the electrical properties of dielectric materials)

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

1. A brief summary of the knowledge or skill the course is intended to develop;
2. A description of the teaching strategies to be used in the course to develop that knowledge or skill.
3. The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

d. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course the student will be able to:

2. Describe the vector and scalar fields, Cartesian, spherical polar, cylindrical coordinates, integral vector calculus , div, grad, and curl operations with geometric interpretations, stokes and gauss theorems, Dirac delta function
3. Calculate the force between the charges by Coulomb's Law, Electric Field and potentials of fixed charge points, linear charge, surface and volume charge density, dipole and multipole expansion. Gauss' Law in integral and differential form.

4. Solve the Electrostatic Problems by Laplace's Equation and Uniqueness by Separation of variables in Cartesian, Spherical and cylindrical coordinates, Image Charge Methods for grounded planes and spheres in external fields.
5. Understand the Dielectric materials , Polarization and its Realization in Matter, The displacement field D, free charge, and modified Gauss Law, Boundary conditions and symmetric problems with displacement field, molecular fields and ferroelectricity.
6. Determine the electrostatic energy and capacitance of Capacitors
7. Explain the Currents and the Continuity Equation

(ii) Teaching strategies to be used to develop that knowledge

1. The methodology of teaching that includes a curriculum design, planning and delivering teaching and assessment, combination of lectures and web-interactions by the lecturer. These will be given the opportunity of students to understand the basic science of the electromagnetic specially in electrostatic case and its different applications in life.
2. Feedback and evaluation that include:

- Flipping the lecture by using quizzes, blackboard, power point and e-learning
- Effective by solve some examples during the lecture
- Reflective learning, multi-cultural of electromagnetic and emotional intelligence.
- Creating productive online electromagnetic for learning and teaching, transition and participation into education.
- Observing teaching and learning and creating productive classroom.
- Small group teaching and assessment learning.
- Designing and implementing an 'outcomes-based' curriculum.
- Teaching for reflective learning and research methods.
- Seminar presentation and on-line learning process with (images and movies)
- Collect the new information about what the new in electromagnetic
- Enable the reference books and scientific sites concerning electromagnetic and its application in internet.
- Teaching for employability,
- Monitoring the student experience

(iii) Methods of assessment of knowledge acquired:

1. Periodical quizzes, assignments and homework
2. First and second mid- term exam and final exam
3. Emphasis of the students in the presence of the lecture continuously
4. Making the students are working small projects and report for electromagnetically and its applications around us.
5. Ask the student to clear the miss understanding of the course

b. Cognitive Skills

(i) Cognitive skills to be developed

At the end of the course students should be able to have

1. Understanding of the physical principles of electromagnetism, and their application to physical phenomena.
2. Use physical laws and principles to understand the subject
3. Simplify problems and analyze phenomena
4. Analyse and explain natural phenomena.
5. Ability to explain the idea with the student own words.
6. Ability to identify, formulate and solve the electromagnetic represent the problems mathematically

(ii) Teaching strategies to be used to develop these cognitive skills:

1. Preparing main outlines for teaching in the starting of the lecture
2. Define tasks for each chapter
3. Open discussions during the lectures
4. Brain storming, group work, homework assignments and small project
5. Encourage the student to look for the information in different sources

(iii) Methods of assessment of students cognitive skills

1. All exams and short quizzes must contain questions that can measure these skills.
2. Asking the students about physical meaning and laws previously taught
3. Emphasize the student writing reports on selected parts of the course
4. Discussions of how to simplify or analyse after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

1. Learn independently and take up responsibility
2. Fluent in dealing with others and collaborative work.
3. Respects the opinions of others .
4. Accepts criticism.
5. Evaluate electromagnetic information.
6. Analyse electromagnetic data.
7. Choose representative examples for each group of electromagnetic .

(iv) Teaching strategies to be used to develop these skills and abilities

1. Learn how to search the internet and use the library
2. Teamwork and small group discussion
3. Interactive learning
4. Case Study

(v) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

1. Making quizzes on the previous lecture.
2. Checking report and evaluate the efforts and scientific values of each student in preparing

report.
3. Mini project and evaluate the work in team
4. Evaluation of the role of each student in teamwork assignment
5. Assignments and evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(iv) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

1. Feeling mathematical reality of solving the problems
2. Enhancing the ability of students to use computers and internet for electromagnetic research.
3. Interpretation and discussing the electromagnetic phenomena and data
4. Present electromagnetic data orally and know how to write a report.

1. Teaching strategies to be used to develop these skills.

1. Know the basic physical principles of electromagnetic.
2. Discuss with the student
3. Homework (preparing a report on some topics related to the course depending on web sites).
4. Seminars presentation
5. Field visits to laboratory and factories

(v) Methods of assessment of students numerical and communication skills

1. Their interaction with the lectures and discussions
2. Evaluation of presentations
3. Evaluation of reports
4. Practical exam

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

- NA

(ii) Teaching strategies to be used to develop these skills

- NA

(vi) Methods of assessment of students psychomotor skills

- NA

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment

1	Midterm 1	5th week	15%
2	Midterm 2	10th week	15%
3	Quizzes and In-Class Problem Solving	Each 2 weeks w	5%
4	Presence of students	All lectures	5%
5	Small project	12th week	5%
6	Homework	Every week	5%
7	Final exam	End of semester	50%

D. Student Support

4. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

- Department and Faculty web-page with communication tolls in black board. •
- 4 Office hours/ week.

E. Learning Resources

1- Required Text(s):

- Foundations of Electromagnetic Theory by Reitz, John R., Milford, Frederick J., Christy, Robert W. [Addison-Wesley, 2008] 4th Edition
- Electromagnetic Fields and Waves by Paul Lorrain, Dale R. Corson, Francois Lorrain [W. H. Freeman and Company, 1988] 3rd Edition
- Introduction to Electrodynamics by David J. Griffiths, [Prentice-Hall, Inc., 1999], 3rd Edition.

2- Recommended Reading List

- Elements of Electromagnetics : M. N. O. sadiku [Oxford University Press, 2001] 3rd Edition.

3-Electronic Materials, Web Sites

- Web Sites, Social Media, Blackboard, Facebook, Twitter, etc.)
- Consult courses in website of the certified universities,.

4- Other learning material such as computer-based programs/CD, professional standards/regulations

- PPT lectures prepared by Prof. Dr. Roshdi Seoudi

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Classrooms enough for 40 students, Black (white) boards
- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (60) and air conditioned.

2. Computing resources

- Providing class rooms with computers , AV, data show, Smart Board, software, etc.)

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Does not exist

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures
- Meeting with students
- Open door policy

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
- E-Learning Suggestions - e-Learning Documentation

3. Processes for Improvement of Teaching

- Preparing the course as PPT.
- Using scientific movies.
- Periodical revision of course content.
- Report writing of the course and determine goals.
- Fortification of the student learning.
- Handling the weakness point

4- Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

After the agreement of Department and Faculty administrations

- The instructors of the course are checking together and put a unique process of evaluation.
- Feedback evaluation of teaching from independent organization.

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

- Periodical revision by Quality Assurance Units in the Department and institution for (Student evaluation, Course report, Program report, Program Self-study, Plan of improvement should be given.
- Collect all reports and evaluations at the end of the year for a reviewing purpose.
- Conduct a workshop to presents finding of reports and evaluation to share knowledge.

Faculty member responsible for the course:

Prepared by faculty staff: 1- Prof. Dr. Roshdi Seoudi 2- Dr. Said Attia 3- Dr. Mongi Ben Moussa	**Signature:**
Date Report Completed: 12/2015	
Revised by: 1. Prof. Dr. Yousry Mostafa 2. Dr. Mohamed Bosstimi	**Signature:**
Date: 2.12.2015	
Program Chair Dr. Hatem Al-amri	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـة الوطنيـة للتقويـم
والاعـتـمـاد الأكـاديـمـي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title **Modern physics**

Course code: **4-403350**

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

Course title : Modern physics Course code: 4-403350
2. Credit hours: 4 . (3 lecturer + 1 practical or lab.)
3. Program(s) in which the course is offered. : B.Sc Medical Physics
18. Name of faculty member responsible for the course: **Dr. Abd Almajid**
5. Level/year at which this course is offered: 5^{th} level
6. Pre-requisites for this course (if any): method in theoretical physics 1 code/ 403243-2
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

For students undertaking this course, the aims are to:

1-**acquire** basics of the spatial theory of the relativity.
2-Acquire the basic of the radiation of black body and objects.
3-**Calculate** the phase and group velocities.
5-Describe atom structure (Atomic models, Alpha-particle scattering, The Rutherford scattering formula, Nuclear dimensions, Electron orbits, Atomic spectra, The Bohr atom, Energy levels and spectra, Nuclear Motion, Atomic excitation, The correspondence Principle).
6- acquire information about particles proprieties of waves
7- **List** the différents physics phenomena (The photoelectric effect, The quantum theory of light, X rays X-ray diffraction, The Compton effect, Pair production)
8- **describe** the UV catastrophe.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

. C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
THE SPATIAL THEORY OF THE RELATIVITY (introduction, reference frame, inertial reference frame, Galilean relativity,)	Week ***(week 1)***	3hrs
THE SPATIAL THEORY OF THE RELATIVITY (Einstein's postulate of relativity, relativity of the simultaneity, time dilatation, length contraction, Lorentz transformations, relativistic velocity transformations,)	Week ***(week 2)***	3hrs
THE SPATIAL THEORY OF THE RELATIVITY (relativistic mechanics, mass, energy, transformation of energy, momentum and force, Doppler effect, Relativistic collisions)	Week ***(week 3)***	3hrs
BLACK BODY RADIATION (radiation of heated objects, thermal radiation, cavity radiation treated with classical physics,)	Week ***(week 4)***	3hrs
BLACK BODY RADIATION (UV catastrophe, Planck's solution,	Week	

quantum of energy)	***(week 5)***	3hrs
PARTICLE PROPERTIES OF WAVES (The photoelectric effect, The quantum theory of light,)	Week ***(week 6)***	3hrs
First Periodic Exam	Week ***(week 7)***	3hrs
PARTICLE PROPERTIES OF WAVES (X rays X-ray diffraction, The Compton effect, Pair production, Gravitational red shift)	Week ***(week 8)***	
WAVE PROPERTIES OF PARTICLES (De Broglie waves, Wave function, De Broglie wave velocity, Phase and group velocities,)	Week ***(week 9)***	3hrs
WAVE PROPERTIES OF PARTICLES (The diffraction of particles,)	Week ***(week 10)***	
Second examination 1	Week ***(week 11)***	3hrs
WAVE PROPERTIES OF PARTICLES (The uncertainty principle, Applications of the uncertainty principle, The wave-particle duality)	Week ***(week 12)***	
ATOMIC STRUCTRUE (Atomic models, Alpha-particle scattering, The Rutherford scattering formula,)	Week ***(week 13)***	3hrs
ATOMIC STRUCTRUE (Nuclear dimensions, Electron orbits, Atomic spectra,)	Week ***(week 14)***	3hrs
ATOMIC STRUCTRUE (Energy levels and spectra, Nuclear Motion, Atomic excitation, The correspondence Principle)	Week ***(week 15)***	
Final examination	Week ***(week 16)***	

2 Course components (total contact hours per semester):			
Lecture 36 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **12 hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

e. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:
- outline the adventages of relativity.
2- list the types of relativities
3- define the inertial reference frame, Galilean relativity.
4- acquire basics of Einstein's postulate of relativity, relativity of the simultaneity, time dilatation, length contraction, Lorentz transformations
5- describe black body and UV catastrophe
6- list different model of atomic structure.
7- describe De Broglie waves, Wave function, De Broglie wave velocity, The diffraction of particles, The uncertainty principle, Applications of the uncertainty principle, The wave-particle duality

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important medical physics in different medical applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

b1. estimate The uncertainty principle
b2. Apply different physics idea in experimental Laboratory.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(vi) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(vii) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

2. Enhancing the ability of students to use computers and internet.
3. Interpret image pre-processing data
4. Use effectively image processing package to enhance the obtained image.
5. Know how to write a report.

6. Teaching strategies to be used to develop these skills

13. Homework (preparing a report on some topics related to the course depending on web sites).

14. Seminars presentation

15. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

10. Evaluation of presentations

11. Evaluation of reports

12. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

NA

(ii) Teaching strategies to be used to develop these skills

- Follow up students the students in lab and during carryout all microbiological techniques

16. **Methods of assessment of students psychomotor skills**

- Giving additional marks for preparing correct media, bacterial slides , good seminar presentation
- Practical exam.

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	Exercises & Home works+ quizzes	All weeks	5%
	Assay	15th week	5%
2	Laboratory	All weeks	20 %
3	Written Test (1)	6th week	10%
4	Written Test (2)	11th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

5. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)
1-Jeremy Bernstein, Paul Fishbane and Stephen Gasiorowicz , Modern Physics, 2-Hardback (2000).
2-Randy Harris, Modern Physics (2nd Edition), International Edition
3-A. Beiser (2003). Concepts of Modern Physics (6th ed.). McGraw-Hill

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Electronic Materials, Web Sites
(eg. Web Sites, Social Media, Blackboard, etc.)

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)
- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources
- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)
- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching
- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.

• Coupling the theoretical part with laboratory part • Periodical revision of course content.
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: **Associate prof. Abdulmajid T.**	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

Level 6

403389-3 Physics of Medical Imaging

403344-3 Quantum Mechanics I

403386-4 Physics of radiation therapy I

403385-4 Medical radiation Physics I

403390-2 Physics Ultrasound in Medicine

403388-2 Raiation Protection

403391-1 Computing in Medicine

601401-2 Islamic Culture IV

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Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title: **Physics of Medical Imaging**

Course code: **403389-3**

Prof. Dr. Khaled Abdel-Waged

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

Course title: Physics of Medical Imaging Course code: **403389-3**
2. Credit hours: 4 . (3 lecturer + 1 practical or lab.)
3. Program(s) in which the course is offered. : B.Sc Medical Physics
1. Name of faculty member responsible for the course: **Dr. Ramadan Ali Hassan**
5. Level/year at which this course is offered: Level 6 / Third year
6. Pre-requisites for this course (if any): Physics of Radiation Effects / Code: 403384-2
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives (hyper link of Medical physics plan)

1. Summary of the main learning outcomes for students enrolled in the course.

The course aims to give the students the chance to:

1- Understand basic Fundamentals of the physics of different image modalities.
2- Describe, in words, merits and drawbacks of each imaging modality.
3- Compare the different method of image processing of different modalities.
4- Interpret the images and state the artifacts of each imaging modality
5- Differentiate between the medical applications of different imaging modalities..

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

1- Matelab program is applied on some imaging modalities to simulate the performance of the calculations as in the hospital
2- Cooperate with hospitals to find how they deal with the subject

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

The course will cover the principle of different medical imaging modalities. This course will provide analysis of different medical imaging modalities

Topics to be covered

Topics	No. Of Weeks	Contact hours
1 **Introduction to digital image** processing - Digital images - Image quality - Basic image operations	**2**	**6**
2 Radiography Introduction - X-ray tube - Interaction with matter - X-ray detectors - Dual-energy imaging - Image quality - Equipment - Clinical use - Biologic effects and safety - Future expectations	**3**	**9**
3 **X-ray computed tomography** Introduction - X-ray detectors in CT - Imaging - Cardiac CT - Dual-energy CT - Image quality - Equipment - Clinical use - Biologic effects and safety - Future expectations	**3**	**9**
4 **Magnetic resonance imaging** Introduction - Physics of the transmitted signal - Interaction with tissue - Signal detection and detector - Imaging - Image quality - Equipment - Clinical use - Biologic effects and safety - Future expectations	**3**	**9**

5 Nuclear Imaging (PET/SPECT) Introduction - image quality - Equipment - Clinical use - Biologic effects and safety - Future expectations	**3**	**9**
	14 weeks	**42hrs**

2 Course components (total contact hours per semester):			
Lecture :42	**Tutorial:**	**Practical:**	**Other:**

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

Self study (web search, library, reports, homework, etc) **8 hrs**

4. Development of Learning Outcomes in Domains of Learning

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.

a. Knowledge

knowledge that students should know and understand.

At the end of the course, the student should be able to:

a1. Understand the basic physical principles of different imaging modalities.
a2. List the tools required for each imaging modality
a3. Outline the merits and drawbacks of each imaging modality .
a4. Use mathematical formulation to describe the physical principle of different imaging modes

(ii) Teaching strategies to be used to develop that knowledge

The strategies used to develop the above knowledge are as follows:-

- Demonstrating the basic information and principles through lectures
- Start each chapter by general idea and the benefit of it.
- Brain storming sessions.
- Discussions.
- Self learning

(iii) Methods of assessment of knowledge acquired

- Quizzes
- Electronic exams
- Homeworks
- Discussion in the lecture
- Short exams (midterm exam)
- Long exam (final exam)

b. Cognitive Skills

Cognitive Skills that students should know and

at the end of the course the student should be able to:

b1. Interpret the physical principle of the imaging modality and its usage in the design of the equipment .

b2. Solve problems related to the mathematical principles of the imaging modality

b3. Compare between the properties of different imaging modes and their medical applications

b4. Analyse different artefacts of images of different imaging modalities.

(ii) Teaching strategies to be used to develop these skills and abilities

- Using Matlab program to analyze the ultrasound images
- Group Discussion
- Encourage the student to look for the information in different references

(iii) Methods of assessment of Cognitive Skills

- Homeworks
- Short tests (midterm exam)
- Long exam (final)
- Electronic exam
- Seminar

c. interpersonal skills and responsibility:

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed.

At the end of the course the student should be able to:

c1. Summarize the different modes of imaging.

c2- interpret the artefacts of the images for each imaging modality.

c3- justify the essential parts of different clinical situations and formulate a strategy for the optimum setup of each clinical situation.

Throughout the course the student well have the capacity for self-directed learning, and personal and social responsibility.

(ii) Teaching strategies to be used to develop these skills and abilities

- Flipped classroom

Students are encouraged to perform the class activity in group using the flipped classroom

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

Assessment of group assignment includes component for individual contribution.
Capacity for independent study assessed in individual assignments.

- Report
- Short quiz in class
- Discussion in class

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain. ***At the end of the course the student should be able to:***

d1. Use software to analyze the images of different modalities
d2. Work in dependently and in group to represent a seminar about topic related to the study.
d3. Use internet to search for topics and writing reports
d4. Know the standards for writing a good report

(ii) Teaching strategies to be used to develop these skills

- Group seminar discussion
- Reports about different tasks

(iii) Methods of assessment of students numerical and communication skills

- Report assignment
- Class activities assignment
- Electronic exams

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

NA

(ii) Teaching strategies to be used to develop these skills

NA

(iii) Methods of assessment of students psychomotor skills

NA

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	Midterm 1	7^{th} week	10 %
2	Midterm 2	14^{th} week	10%
3	Project + Electronic exams	5^{th} - 12^{th} week	10%
4	Homework	During the semester	10%
5	Reports (5 reports/semester)	During the semester	10 %
5	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)

1- 5-office hours per week in the lecturer schedule.

2- The contact with students by e-mail and website

E. Learning Resources

1. Required Text(s)

2. Essential References

1- Medical Imaging Physics. W.R. Hendee &E.R. Ritenour, 2nd Eds, Wiley, 2002

2- Essential Nuclear Medicine Physics. R.A.Powsner &E.R.Powsner, 1st Eds, Blackwell publishing Ltd,2006.

3- PET Physics, Instrumentation and Scanners. M.E.Phelps, 2nd Eds., Springer,2006

4- Positron Emission Tomography. D.L.Bailey & D.V.Townsend, 1st Eds., Springer, 2005

3- Recommended Books and Reference:

1- Fundamentals of Medical Imaging Second Edition Paul Suetens Cambridge University Press 2009

2- Introduction to Medical Imaging Smith and A. Webb Cambridge University Press 2011.
4-.Electronic Materials, Web Sites etc http://www.excelmedicalimaging.com/ http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=6159236 http://www.nema.org/prod/med/
5- Other learning material such as computer-based programs/CD, professional standards/regulations Application of Matlab program on some selected images of different imaging modalities

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.) -The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of student not exceed on 30 in the classroom - Library
2. Computing resources (AV, data show, Smart Board, software, etc.) -Hall is equipped with a computer. - Provide overhead projectors and related items -Smart board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) None

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Quizzes, midterm and final exams • Electronic student evaluation is organized by the university measurement and evaluation unit
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor • Electronic exams • Evaluation of course by another colleagues

3 Processes for Improvement of Teaching

- Using of interactive learning movies
- Application of flipped classroom
- Periodic updating of the 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.

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

5- - The following points may help to get the course effectiveness
  - Student evaluation
  - Course report
  - Program report
  - Program Self study report

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

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

Faculty member responsible for the course:

Prepared by faculty staff: 1. 2.	**Signature:**
Date Report Completed: 09/2015	
Revised by: 1. 2 3	**Signature:**
Date: 1.10.2015	
Program Chair Dr.	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

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COURSE SPECIFICATION

Course title **Quantum Mechanics (1)**

Course code: **403344-3**

Dr. Abdel Rahman Yousef Lashin

Revised Safar 1436 H

Revised 13 December 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm Al-Qura University
College/Department: Faculty of Applied Science – Department of Physics

A Course Identification and General Information

2. Course title: Quantum Mechanics (1) **3. Course code: 403344-3**
2. Credit hours: 3 hrs
3. Program(s) in which the course is offered.: BSc Physics
4. Name of faculty member responsible for the course: **Dr. Abdel Rahman Yousef Lashin**
5. Level/year at which this course is offered: 3rd Year / 5th Level
6. Pre-requisites for this course (if any): Theoretical Methods in Physics (2) (403244-3)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

After completing this course student should be able to:

The quantum mechanics (1) start with the reasons and natural phenomena that have led to the emergence of quantum mechanics; this is done by highlighting the difficulty of the classic mechanics to explain many phenomena that indicate duality of the particle and wave. In order for the student to understand these phenomena we discussed

1. Radiation- Planck's law, photoelectric effect, Compton effect, Wave Nature of matter, De Broglie waves, diffraction of matter waves.
2. Expectation values, principle of superposition; Quantum mechanical operators: Three important quantum mechanical operators, eigenfunctions and eigenvalues, properties of operators, measurability of different observables at equal times, Heisenberg's uncertainty principle, angular momentum operator.
3. Kinetic energy, total energy, bra and ket notation, Schrodinger equation, Postulates, formulation, properties of stationary states.
4. Solution of Schrodinger Equation, free particle, harmonic oscillator, particle in a box, constants of motion, conservation laws, Hydrogen atom, Wavefunctions, hydrogen atom spectrum.
5. The eigenstates of Spin 1/2, addition of two spins, the addition of spin 1/2 and orbital angular momentum, and general rules for addition of angular momenta.
6. Matrix representation of angular momentum operators, and general relations in matrix mechanics.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

1 Topics to be Covered		
Topic	No of Weeks	Contact hours

❖ **Wave Particle Duality, Probability, and the Schrodinger Equation** • Radiation as Particles, Electrons as Waves. • Plane Waves and Wavepackets. • The Probability Interpretation of the Wavefunction. • The Schrodinger Equation. • The Heisenberg Uncertainty Relations. • The Probability Current. • Expectation Values and the Momentum in Wave Mechanics; The Momentum in Wave Mechanics, Wavefunction in Momentum Space.	**2**	**6**
❖ **Eigenvalues, Eigenfunctions, and the Expansion Postulate** • The Time-Independent Schrodinger Equation. • Eigenvalue Equations. • The Eigenvalue Problem for a Particle in a Box. • The Expansion Postulate and Its Physical Interpretation. • Momentum Eigenfunctions and the Free Particle; Normalization of the Free Particle Wave Function, Degeneracy. • Parity.	**2**	**6**
❖ **One-Dimensional Potentials** • The Potential Step. • The Potential Well. • The Potential Barrier. • An Example of Tunneling. • Bound States in a Potential Well. • The Harmonic Oscillator.	**2**	**6**
❖ **The General Structure of Wave Mechanics** • Eigenfunctions and Eigenvalues; The Hamiltonian Operator. • Other Observables. • Vector Spaces and Operators. • Degeneracy and Simultaneous Observables. • Time Dependence and the Classical Limit.	**2**	**6**
❖ **Angular Momentum** • The Angular Momentum Commutation Relations. • Raising and Lowering Operators for Angular Momentum. • Representation of $\lvert \ell, \mathbf{m} \rangle$ States in Spherical Coordinates.	**1**	**3**

❖ **The Schrodinger Equation in Three Dimensions and the Hydrogen Atom** • The Central Potential. • The Hydrogen Atom. • The Energy Spectrum. • The Free Particle.	**2**	**6**
❖ **Spin** • Eigenstates of Spin 1/2. • The Intrinstic Magnetic Moment of Spin 1/2 Particles. • Addition of Two Spins. • The Addition of Spin 1/2 and Orbital Angular Momentum. • General Rules for Addition of Angular Momenta.	**1.5**	**4.5**
❖ **Matrix Representation of Operators** • Matrices in Quantum Mechanics. • Matrix Representation of Angular Momentum Operators. • General Relations in Marix Mechanics. • Matrix Representation of Spin 1/2.	**1.5**	**4.5**
	14 Week	**42 Hours**

2 Course components (total contact hours per semester):			
Lecture: 42 hr	**Tutorial:**	**Practical:**	**Other: 14 hr**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week):

14 hr

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

1- A brief summary of the knowledge or skill the course is intended to develop.

2- A description of the teaching strategies to be used in the course to develop that knowledge or skill.

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

f. Knowledge: Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:

1- Learn to be acquainted with the historical background of quantum mechanics, wave-particle description-the uncertainty principle and Schrodinger equation.

2- Understand the physics of quantum mechanics and their applications mentioned in the text.

3- Use mathematical formulation to describe the physical principle or phenomena.

4- Explain how things are working.

(ii) Teaching strategies to be used to develop that knowledge

1- Demonstrating the basic information and principles through lectures and the achieved applications.
2- Discussing phenomena with illustrating pictures and diagrams.
3- Lecturing method:
   a. Blackboard
   b. Power point
   c. e-learning
4- Tutorials.
5- Revisit concepts.
6- Discussions.
7- Brain storming sessions.
8- Start each chapter by general idea and the benefit of it.
9- Learn the student background of the subject.
10- Show the best ways to deal with the problem.
11- Keep the question "why" or "how" to explain always there.
12- Build a strategy to solve the problem.

(iii) Methods of assessment of knowledge acquired:

- Quizzes and Homeworks 20%
- Short exams (mid term exams) 30%

- Long exams (final) 50%

b. Cognitive Skills

(i) Cognitive skills to be developed

Having successfully completed the course students should be able to:

1- Acquired a firm background in the foundations of quantum mechanics and have the students' desire kindled to discover more in the second part of the course.

2- Analyse the observed of the particles by solving the Schrodinger equation.

3- Understand the theoretical treatments of quantum mechanics problems.

4- Do a small research.

(ii) Teaching strategies to be used to develop these cognitive skills:

1. Preparing main outlines for teaching.

2. Following some proofs.

3. Define duties for each chapter.

4. Home work assignments.

5. Encourage the student to look for the information in different references.

6. Ask the student to attend lectures for practice solving problem.

(iii) Methods of assessment of students cognitive skills

1. Midterm exam. Exams, short 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.

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

1. Work independently.
2. The students learn independently and take up responsibility.

(vii) Teaching strategies to be used to develop these skills and abilities

1. Learn how to search the internet and use the library.
2. Learn how to cover missed lectures.
3. Learn how to summarize lectures or to collect materials of the course.

4. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
5. Develop the interest in Science through :(lab work, field trips, ...).
6. Encourage the student to attend lectures regularly by:
    i. Giving bonus marks for attendance
    ii. Assigning marks for attendance.
7. Give students' tasks of duties

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

1. Quizzes on the previous lecture.
2. Discussion.
3. The accuracy of the result gained by each group will indicate the good group work.
4. Presenting the required research on time and the degree of the quality will show the sense of responsibility.

d. Communication, Information Technology and Numerical Skills

(viii) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

1. Computation
2. Problem solving
3. Data analysis and interpretation.

7. Teaching strategies to be used to develop these skills

1. Know the basic mathematical principles.
2. Use the web for research.
3. Discuss with the student.
4. Exams to measure the mathematical skill.
5. Encourage the student to ask for help if needed.
6. Computational analysis.
7. Data representation.
8. Focusing on some real results and its physical meaning.
9. Lectures for problem solution.
10. Encourage the student to ask good questions to help solve the problem.
11. Display the lecture note and homework assignment on the web.

(iii) Methods of assessment of students numerical and communication skills

1. Their interaction with the lectures and discussions.
2. The reports of different asked tasks.
3. Homework, Problem solutions, assignment and exam should focus on the understanding.
4. Results of computations and analysis.
5. Comments on some resulting numbers.
6. Research.

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to: (NA)

(ii) Teaching strategies to be used to develop these skills (NA)

(iii) Methods of assessment of students psychomotor skills (NA)

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	In-Class Problem Solving	13th,7th week	10%
4	Midterm 1	6th week	15%
5	Midterm 2	10th week	15%
6	Final Exam	16th week	50%

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Each student will supervise by an academic adviser in the physics department and the time table for academic advice were given to the student each semester. (4 hrs office hours).

E. Learning Resources

Required Text(s):

1. S. Gasiorowicz, "Quantum Mechanics", John Wiley & Sons, Inc., 3rd Ed. (2003).

Recommended Reading List

1- David J. Griffiths "Introduction to Quantum Mechanics", Pearson Prentice Hall, New York, USA, (2005).

2- Nouredine Zettili, "Quantum Mechanics: Concepts and Applications", John Wiley & Sons, Inc. (2001).

Electronic Materials, Web Sites

- http://en.wikipedia.org/wiki/Quantum Mechanics/
- http://www.dmoz.org/Science/Physics/Quantum Mechanics/

Other learning material such as computer-based programs/CD, professional standards/regulations (NA)

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Lecture room for 30 students.
- Library.

2. Computing resources

- Computer room.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) (NA)

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- 10 minutes Quiz per week.
- Home works.
- Term paper.
- Final Exam.

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

- At the end of term, Students fill an evaluation Sheet (without names).
- Student Marks are analyzed by considering Standard Deviation.

3. Processes for Improvement of Teaching

- Strategies are modified each term according to the student feedback.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- In case of more than one section taken this course, the instructors are cooperated to give unified Exams and they use the same marks distribution for the answer sheet. Students can see their corrected sheet and compare it with key answer sheet.

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.
4- Add some subject and cut off others depending on the new discoveries in physics.

Date: 13 December 2015

Head of the Physics Department

Dr. Hatem Alamri

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقويـم
والاعـتـمـــاد الأكـاديـمـــي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title **Physics of Radiotherapy1**

Course code: **403386-4**

Prof. Dr. Samir Netto

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

4. Course title : **Physics of Radiotherapy**1 **5.** Course code: **403386-4**
2. Credit hours: 4Cr. (3 + 1Lab)
3. Program(s) in which the course is offered. : B.Sc Medical Physics
6. Name of faculty member responsible for the course: **Prof. Dr. Samir Netto**
5. Level/year at which this course is offered: 6level /third year
6. Pre-requisites for this course (if any): Physics of radiation effect / Code: 403384-2) (403284-2)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

For students undertaking this course, the aims are to:

-1-Explain what Is radiotherapy? Why and when we use radiotherapy and the goal of it?
2- Define different Types of Radiotherapy.
3- Understand the basic component of radiotherapy equipment(kilovoltage machine ,Co-60 machine, linear acclerators , simulator,
4-State the different ranges of kilovoltage energies.
5-describe the structure of a typical kilovoltage treatment tube.
6-Describe the basic components of a cobalt unit.
7-Understand the role the components of a linear accelerator play in X -ray production.
8-Describe the unit of absorbed dose and exposure.
9- Explain the dose calculation in radiotherapy.
10- Define the tumour volume in the patient.
11-Calculate the resultant dose distribution in the patient.
8- Understand the basic physical principles of electron beam therapy.
7- Understand the quality assurance in radiotherapy.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

This course interested in subjects such as Ionizing radiation use in radiation therapy to cause controlled biological effects in cancer patients. Physics of the interaction of the various radiation modalities with body-equivalent materials, and physical aspects of clinical applications; lecture and lab.
Physics of ionizing radiation therapy with emphasis on external beam dosimetry and treatment planning.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1 Topics to be Covered :-		
Topics	No of Weeks	Contact hours
(1)Radiation in the treatment of cancer **1-Kilovoltage x-ray Units** **2-Linear Accelerator** **3-Cobalt Machines** **4-Simulator**	**2 weeks (2&3)**	**6 hrs**
(2)Dose Distribution and Scatter analysis **1-Phantoms** **2- Depth Dose Distribution** **3-Percentage Depth Dose** **4-Tissue-Air Radio** **5-Scatter-air Ratio**	**1 weeks (4)**	**3 hrs**
(3)Patient dose Computation Methods **1- Acquisition of patient data** **2-Treatment simulation** **3-Source to axis distance and isocentric techniques**	**1 weeks (5)**	**3 hrs**
First Mid Term Exam	**Week 6**	**2hrs**

(4)A system of Dosimetric calculations **1-Dose calculation parameters** **2- Practical applications** **(a)Accelerator Calculations** **(b)Cobalt-60 Calculations** **(c) Irregular Fields** **(D)Asymmetric Fields**	**2week (7,8)**	**7 hrs**
(5)Treatment Planning I:Isodose Distribution **1- Isodose chart** **2-Measurement of isodose curves**	**1week (9)**	**3 hrs**
(6)Treatment Planning: Patient data, Corrections, and set-up **1-parameters of isodose curves** **2-Wedge filters** **3-Combination of radiation fields** **4-Wedge field techniques** **5-Tumor dose specification for external photon beams**	**2 weeks (10,11)**	**7 hrs**
Second Mid-term Exam	**Week 12**	**2hrs**
(7)Treatment Planning: Field Shaping, Skin dose, and Field Separation. **1-Field blocks** **2-Field shaping** **3-Skin dose** **4-Separation of adjacent fields.**	**1 week (13)**	**3 hrs**
(8)Electron beam Therapy **1-Electron interactions** **2-Determination of absorbed dose** **3-Characteristics of clinical electron beams** **4-Field shaping**	**1 week (14)**	**3 hrs**
(9)Dose Fractionation in radiotherapy **(10)Quality Assurance**	**1 week (15)**	**3hrs**

2 Course components (total contact hours per semester):

Lecture 36 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:42	Other: **20hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

g. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:

-Understand the role of radiotherapy

-calculate the dose distribution for photon and electron beam

-Understanding how to do the quality -assurance of linear accelerators and cobalt machines

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important medical physics in different medical applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

compare between different type of external radiotherapy and its applications.
Solve the problem related to the calculation of dose to the patient using different types of techniques.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

(viii) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(ix) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

8. Enhancing the ability of students to use computers and internet.
9. Interpret image pre-processing data
10. Use effectively image processing package to enhance the obtained image.
11. Know how to write a report.

12. Teaching strategies to be used to develop these skills

17. Homework (preparing a report on some topics related to the course depending

on web sites).

18. Seminars presentation

19. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

13. Evaluation of presentations

14. Evaluation of reports

15. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

- NA

(ii) Teaching strategies to be used to develop these skills

- Follow up students the students in lab and during carryout all microbiological techniques

Methods of assessment of students psychomotor skills

- N. A

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	12th week	15%
5	Practical	15th week	20%
6	Final Exam (theoretical)	16th week	40%

D. Student Support

1.Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

(1) Faiz.M.Khan" the physics of radiation therapy"3rd ed.by Lippincott Williams&Wilkins 2003

(2)Philip Mayles,Alan Nahum"handbook of radiotherapy physics:theory and practice" Taylor&Francis 2007

(3)) Faiz.M.Khan "Treatment Planning in radiation Oncology" 2nd aedition,Lippincott Williams&Wilkins 2007.

(4)Podgorsal.E.B."Radiation Oncology Physics:a handbool for teachers and students "international Atomic energy agency,Vienna,2005

(5)Cherry P.Duxbury A."Practical Radiotherapy Physics and Equipment"Greenwich Medical Media Limited 1998

(6) Brady L.W.& Heilmann H.P.:Medical Radiology radiation Oncology"Springer 2006.

Electronic Materials, Web Sites
(eg. Web Sites, Social Media, Blackboard, etc.)

http :// www.AAPM.org

http:// www.sciencedirect.com

(1) International atomic energy agency (IAEA) reports

(2) American Association of physicist in medicine (AAPM) reports and journals

(3) National Council on Radiation Protection & Measurements (NCRP)

(4) International Commission on Radiation Unit & measurements(ICRU)

Other learning material such as computer-based programs/CD, professional standards/regulations

-

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- After the agreement of Department and Faculty administrations

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

- Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Aida Radwan	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقويـم
والاعـتـمـــاد الأكـاديـمـــي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title **MEDICAL RADIATION PHYSICS 1**

Course code: 403385-4

Dr. Taha Alfawwal

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

Course title : MEDICAL RADIATION PHYSICS 1 **Course code:** 403385-4
2. Credit hours: 4 . (3 lecturer + 1 practical or lab.)
3. Program(s) in which the course is offered. : B.Sc Medical Physics
7. Name of faculty member responsible for the course: **Dr. Taha Alfawwal**
5. Level/year at which this course is offered: 6th level
6. Pre-requisites for this course (if any): Physics of radiation effect (403284-2)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

.1.Study Production of X Rays : Accelerated Charged Particle, Synchrotron Radiation, Linear Accelerator
2-Acquire the interaction of radiation with matter , natural background radiation and general Aspects of Radioactive Decay Processes
3-Study the Activity; Naturally Occurring Radiation, Serial Transformation.
4- **List** a scientific method to come to understand the enormous variety of radiation physics phenomena in terms of a few relatively simple laws

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

Performing dosimetry procedure to monitor ionizing radiation in hospital and radiation areas. Performing shielding tests and shielding design. Practicing regulations and record keeping associated with radiation monitoring and radiation safety.

C. Course Description **(Note: General description in the form to be used for the Bulletin or Handbook should be attached)**

1 Topics to be Covered		
	No of Weeks	Contact hours
Production of X Rays : Accelerated Charged Particle Synchrotron Radiation Linear Accelerator	2 weeks (1 &2 weeks)	6 hrs
Fundamental Sciences Quantities and units in science and engineering Background information Excitation and Ionization Characteristic x-ray Binding Energy The chart of nuclides	2 Weeks) (3 & 4 weeks)	6 hrs

Interaction of radiation with matter Alpha particle interactions Beta particle interactions Specific ionization Mass stopping power Linear energy transfer Bremsstrahlung Radioactive atoms- Nature and Behaviour Alpha emission Positron emission Orbital electron capture Beta emission	2weeks ***(week 5 & 6)***	6 hrs
First Periodic Exam	Week ***(week 7)***	
Med Term Vacation	Week ***(week 8)***	
Gamma ray emission Internal Conversion Electrons Auger electron Transformation kinetics Average life Specific activity Time of maximum progeny activity Tracing radioactive decay on the chart of the nuclides	***(week)*** 2 ***(week 9 and 10)***	6 hrs
Radiation quantities and units Exposure Absorbed dose and equivalent dose Radioactivity	Week ***(week 11)***	3hrs
Biological Effects of Ionizing Radiation Non Stochastic Effects Death from whole body exposure The Acute Radiation Syndrome Damage to skin Stochastic effect	Week ***(week 12 & 13)***	6 hrs
Radiation Protection in Medicine Radiation protection goals Radiation protection in medical imaging technology Radiation protection in nuclear medicine Radiation protection in radiotherapy	Week ***(week 14)***	3hrs
Second examination 1	Week ***(week 15)***	
Final examination	Week ***(week 16)***	

2 Course components (total contact hours per semester):			
Lecture 36 Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **18 hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

h. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:
1- outline fundamental Sciences, Quantities and units in science and engineering, Background information Excitation and Ionization , Characteristic X-ray, Binding Energy and the chart of nuclides.
2- list the differents instruments for production X Rays : Accelerated Charged Particle , Synchrotron Radiation and Linear Accelerator
3-State **Interaction of radiation with matter,** Alpha particle interactions, Beta article interactions, Specific ionization, Mass stopping power, Linear energy transfer, Bremsstrahlung, Radioactive atoms-Nature and Behaviour, Alpha emission,
Positron emission ,Orbital electron capture and Beta emission
4- describe the interaction of radiation with matter , natural background radiation and general Aspects of adioactive Decay Processes

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important medical physics in different medical applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced

and communicate them through printed and verbal media.

b. Cognitive Skills

B1. Estimate use physical laws and principles to understand the subject and to simplify problems and analyze phenomena
Represent the problems mathematically.
B2. Estimate the external exposure with different distances for calibration of the TLD(s) dosimetry.
B3. justify the mathematical expressions in calculating the doses due the inverse square law .
B4. integrate information technology (IT) based solution into radiation dose measurements in environment and medicine..

B5.Analyse and explain natural phenomena.

B6.Ability to explain the idea with the student own words.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(ix) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(x) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

13. Enhancing the ability of students to use computers and internet.
14. Interpret image pre-processing data
15. Use effectively image processing package to enhance the obtained image.
16. Know how to write a report.

17. Teaching strategies to be used to develop these skills

20. Homework (preparing a report on some topics related to the course depending on web sites).
21. Seminars presentation
22. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

16. Evaluation of presentations

17. Evaluation of reports

18. Practical exam

e. Psychomotor Skills (if applicable)

NA

(ii) Teaching strategies to be used to develop these skills

- Follow up students the students in lab and during carryout all microbiological techniques

23. **Methods of assessment of students psychomotor skills**

- N.A

- Practical exam.

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	Exercises & Home works+ quizzes	All weeks	5%
	Assay	15th week	5%
2	Laboratory	All weeks	20 %
3	Written Test (1)	6th week	10%
4	Written Test (2)	11th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

6. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

Michael G. Stabin" Radiation Protection and Dosimetry" 2007.Ch5. p-p, 67-74
Herman Cember " Introduction to Health Physics" 1983, 2003, 2009.Ch6. p-p, 135-142.,Ch.10-p. 529.

Electronic Materials, Web Sites

(eg. Web Sites, Social Media, Blackboard, etc.) http://www.IAEA.com, http://ICRP.com, http://NCRP..com., http://ICRU.com, http://UNSCAR.com, http://ANSI.com, http://WHO.com

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Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- After the agreement of Department and Faculty administrations

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

- Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Taha Alfawwal	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair	**Signature:**

Dr. Hatem Alomri	
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

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COURSE SPECIFICATION

Course title **Physics of Ultrasound in Medicine**

Course code: 403390-2

Prof. Saud Allehyani

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

Course title: Ultrasound in Medicine **Course code:** 403390-2
2. Credit hours: 2 .
3. Program(s) in which the course is offered. : B.Sc Medical Physics
1. Name of faculty member responsible for the course: **Prof. Saud Allehyani**
5. Level/year at which this course is offered: 6^{th} level
6. Pre-requisites for this course (if any): Health Physics (403383-3)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives (hyper link of Medical physics plan)

1. Summary of the main learning outcomes for students enrolled in the course.

The course aims to give the students the chance to:

1- Understand basic Fundamentals of ultrasound waves: Physics of wave motion, ultrasound intensity, and attenuation of ultrasound.
2- Describe, in words, the ways in which various concepts in ultrasound come into play in particular situations.
3- Represent ultrasound generation and principles of different medical applications.
4- Analyse ultrasound systems using a required basics
5- Differentiate between the behaviours of different modes of ultrasound imaging.

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

1- Image J program is applied on some ultrasound images to simulate the performance of the calculations as in the hospital
2- Cooperate with different institution to find how they deal with the subject

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

The course will cover the principle of ultrasound production and types of transducers. This course will provide a comparison between different modes of operation and artifacts of ultrasound images

Topics to be covered		
Topics	No. Of Weeks	Contact hours
Ultrasound Waves: **1-** Wave Motion 2- Wave Characteristics 3- Velocity of Ultrasound 4- Ultrasound Intensity 5- Acoustic Impedance 6-Ultrasound Wavefront 7- Attenuation of Ultrasound	**2**	**4**
Ultrasound Transducers: **1-** Pizoelectric Effect 2- Transducer Design 3- Frequency response of a transducer 4- Focused Transducer 5- Ophthalmic and Doppler Probes	**3**	**6**

Ultrasound Display System: 1- A-Mode Presentation 2- Echoencephalography 3- B-Mode Presentation 4- Two-dimensional Display of Internal Organs 5- M-Mode Presentation 6- Detection of Heart Movement and Fetus Health State	**5**	**10**
The Doppler Effect: 1- Measurement of the frequency shift 2- Measurement of Reflection from Media of Different Acoustic Impedances	**2**	**4**
Ultrasound Imaging: 1- Basic system of imaging 2- Different types of images and modes 3- artifacts of images	**2**	**4**
	14 weeks	**28 hrs**

2 Course components (total contact hours per semester):			
Lecture : 28	**Tutorial:**	**Practical:**	**Other:**

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

Self study (web search, library, reports, homework, etc) **8 hrs**

4. Development of Learning Outcomes in Domains of Learning

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.

a. Knowledge

knowledge that students should know and understand.
Upon successful completion of this course, the student should be able to:
a1. Understand the fundamentals of ultrasound wave physics.
a2. list the types of transducers and their applications.
a3. define Pizoelectric effect .
a4. use mathematical formulation to describe the physical principle of different imaging modes

(iii) Teaching strategies to be used to develop that knowledge

The strategies used to develop the above knowledge are as follows:-

- Demonstrating the basic information and principles through lectures
- Start each chapter by general idea and the benefit of it.
- Brain storming sessions.
- Discussions.
- Self-learning

(iii) Methods of assessment of knowledge acquired

- Quizzes
- Electronic exams
- Homework
- Discussion in the lecture
- Short exams (midterm exam)
- Long exam (final exam)

b. Cognitive Skills

Cognitive Skills that students should know and
Upon successful completion of this course , the student should be able to:

b1. Interpret the piezoelectric effect and its usage in the design of the transducer.
b2. Solve problems related to the behaviour of ultrasound in the matter (absorption, attenuation reflection, transmission, etc)
b3. Compare between the properties of different ultrasound modes and their medical applications
b4. Analyse different artefacts of ultrasound images.

(ii) Teaching strategies to be used to develop these skills and abilities

- Using ImageJ program to analyze the ultrasound images
- Group Discussion
- Encourage the student to look for the information in different references

(iii) Methods of assessment of Cognitive Skills

- homework
- Short tests (midterm exam)
- Long exam (final)
- Electronic exam
- Seminar

c. interpersonal skills and responsibility:
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed.
At the end of the course, the student should be able to:

c1. Summarize the different modes of ultrasound imaging.
c2– interpret the artefacts of the ultrasound images.
c3– justify the essential parts of a problem and formulate a strategy for solving the problem.
Throughout the course the student well have the capacity for self-directed learning, and personal and social responsibility.

(ii) Teaching strategies to be used to develop these skills and abilities

- Flipped classroom

Students are encouraged to perform the class activity in group using the flipped classroom

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

Assessment of group assignment includes component for individual contribution. Capacity for independent study assessed in individual assignments.

- Report
- Short quiz in class
- Discussion in class

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain. ***At the end of the course the student should be able to:***

d1. Use software to analyse the ultrasound images
d2. Work in dependently and in group to represent a seminar about topic related to the study.
d3. Use internet to search for topics and writing reports
d4. Know the standards for writing a good report

(ii) Teaching strategies to be used to develop these skills

- Group seminar discussion
- Reports about different tasks

(iii) Methods of assessment of students numerical and communication skills

- Report assignment
- Class activities assignment
- Electronic exams

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required

NA

(ii) Teaching strategies to be used to develop these skills

NA
(iii) Methods of assessment of students psychomotor skills **NA**

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	Midterm 1	7^{th} week	10 %
2	Midterm 2	14^{th} week	10%
3	Project + Electronic exams	5^{th} - 12^{th} week	10%
4	Homework	During the semester	10%
5	Reports (5 reports/semester)	During the semester	10 %
5	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) 1- 5-office hours per week in the lecturer schedule. 2- The contact with students by e-mail and website

E. Learning Resources

1. List Required Textbooks
[1] Physics and principles of ultrasound by R. A. Sofferman , Springer, 2012 [2] Basic Physics and Technology of Medical Diagnostic Ultrasound by M. Hussey, elsevier ,2008
2. List Essential References Materials (Journals, Reports, etc.)
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc) Diagnostic Ultrasound: physics and equipment by P. Hoskins, K. Martin and A. Thrush, Cambridge press, 2011.
4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.) http://www.physicsclassroom.com/

http://www.echopedia.org/index.php/The_principle_of_ultrasound http://www.brooksidepress.org/Products/Military_OBGYN/Ultrasound/basic_ultrasound.htm
http://ozradonc.wikidot.com/principles-of-ultrasound
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software Application of ImageJ program on some selected images of different imaging modes

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.) -The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of student not exceed on 30 in the classroom - Library
2. Computing resources (AV, data show, Smart Board, software, etc.) -Hall is equipped with a computer. - Provide overhead projectors and related items -Smart board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) None

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Quizzes, midterm and final exams • Electronic student evaluation is organized by the university measurement and evaluation unit
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor • Electronic exams • Evaluation of course by another colleagues
3 Processes for Improvement of Teaching • Using of interactive learning movies • Application of flipped classroom • Periodic updating of the 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.

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

5- - The following points may help to get the course effectiveness
   - Student evaluation
   - Course report
   - Program report
   - Program Self study report

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

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

Faculty member responsible for the course:

Prepared by faculty staff: 1. 2.	**Signature:**
Date Report Completed: 09/2015	
Revised by: 1. 2 3	**Signature:**
Date: 1.10.2015	
Program Chair Dr.	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

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COURSE SPECIFICATION

Course title Radiation Protection

Course code: 403388-4

Dr. Taha Alfawwal

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : RADIATION PROTECTION **2.** Course code: 4-403388-2
2. Credit hours: 2 hrs
3. Program(s) in which the course is offered. : B.Sc Medical Physics
3. Name of faculty member responsible for the course: **Dr. Taha Alfawwal**
5. Level/year at which this course is offered: 6^{th} level
6. Pre-requisites for this course (if any): Physics of radiation effect (403284-2)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

For students undertaking this course, the aims are to:

1-**acquire** the information about Radiological quantities and units
2-Acquire information about External Radiation Safety
3- study the Shielding against ionizing radiation
4- **Study** the Internal Radiation Safety
5- **acquire** information about non ionizing radiation

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

this course study of the foundations radiation protection and ways to minimize radiation exposure to various internal and external systems to the limits of radiation.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
Radiological quantities and units	**(Week 1,2 and 3)**	2 hrs
Dose quantities in radiation protection, Concept of radiation protection quantities	**Week (Week 4 and 5)**	2 hrs
Radioactivity quantities Activity, specific activity, activity concentration, activity per area, Specific quantities for radon.	**Week (Week 6)**	2 hrs
First Periodic Exam	**Week** (Week 7)	2 hrs
Middle Term Vacation	**Week** (Week 8)	2 hrs
Radiation Safety Guides	**Week (Week 9)**	2 hrs
External Radiation Safety	**Week (Week 10)**	2 hrs

Internal Radiation Safety; Quantities for internal dosimetry,Limits, constraints, action levels	**Week (Week 11)**	2 hrs
Evaluation of Radiation Safety Measures	**Week (Week 12)**	2 hrs
Shielding against ionizing radiation Basic shielding concept Attenuation data of radioactive sources in shielding materials	**Week *(Week13)***	2 hrs
Stopping power and range, Penetration depths of charged particles, Electrons and positrons, Photons. Nonionizing Radiation Safety	**Week Week 14)**(	2 hrs
Second Periodic Exam .	**(week) (week 15)**	
Final Semester Exam.	**(week) (week 16))**	

2 Course components (total contact hours per semester):			
Lecture 30 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **20hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

i. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:
a1-Outline on the radiation quantities units and Concept of radiation protection quantities

a2- Acquire the basic information Radiological quantities , units and dose limit

a3. knowing the External and internal Radiation Safety
a4. Acquire information about external and internal radiation safety.
a5- state Radiation Safety Guides
a6-- Acquire procedure to design X-ray shielding room.

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important medical physics in different medical applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

(**B1. estimate the mathematical calculation of the radiation doses using mathematical and computer software.**
B3. integrate information technology (IT) based solution into radiation dose measurements in environment and medicine.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(x) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(xi) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

18. Enhancing the ability of students to use computers and internet.
19. Interpret image pre-processing data
20. Use effectively image processing package to enhance the obtained image.
21. Know how to write a report.

22. Teaching strategies to be used to develop these skills

24. Homework (preparing a report on some topics related to the course depending on web sites).

25. Seminars presentation

26. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

19. Evaluation of presentations

20. Evaluation of reports

21. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

N. A

(ii) Teaching strategies to be used to develop these skills

- Follow up students the students in lab and during carryout all microbiological techniques

27. **Methods of assessment of students psychomotor skills**

- N. A

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	11th week	15%
5	Assay	15th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

7. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

1- Herman Cember and Thomas E. Johnson "introduction to Health Physics" 4th edi. McGraw-Hill 2009

21. Simon Cherry, Michael E. Phelps "Physics in Nuclear Medicine" 3rd add," Saunders 2003

Electronic Materials, Web Sites

(eg. Web Sites, Social Media, Blackboard, etc.)

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Taha Alfawwal	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

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COURSE SPECIFICATION

Course title Computer in Medicine

Course code: 403391-1

Prof. Dr. Samir Netto

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

4. Course title Computer in Medicine **5. Course code: 403391-1**
2. Credit hours: 1hr
3. Program(s) in which the course is offered. : B.Sc Medical Physics
6. Name of faculty member responsible for the course: **Prof. Dr. Samir Netto**
5. Level/year at which this course is offered: 5th Year / Level 3
6. Pre-requisites for this course (if any): Laser in Medicine (403381-2)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

After completing this course student should be able to:

1. Define Storage and transfer of data in computers number
2. Explain uses Computer in Imaging Nuclear Medicine.
3. Describe Display, Conversion of a Digital Image into an Analog Video Signal.
4. List different uses of Information & Communication Technologies (ICT) and medicine and computer in Medicine.
5. Explain different types of image filtering.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

Medical imaging is a vast field that deals with the techniques to create images of the human body for medical purposes. Many of the modern methods of scanning and imaging are largely based on the computer technology. Magnetic resonance imaging employs computer software. Computed tomography makes use of digital geometry processing techniques to obtain 3-D images. Sophisticated computers and infrared cameras are used for obtaining high-resolution images. Computers are widely used for the generation of 3-D images in medicine.

1 Topics to be Covered

Topic	No of Weeks	Contact hours
Chapter 1 **Computer Digital and Analog Basics** 1.1 **Storage and transfer of data in computers number systems** **1.2 Decimal form (Base 10)** **1.3 Binary form** **1.4 Conversions between decimal and binary forms** **1.5 Digital Representation of Data Bits, Bytes, and Words** **1.6 Digital Representation of Different Types of Data** **1.7 Storage of Positive Integers** **1.8 Binary Representation of Signed Integers** **1.9 Analog Data And Conversion Between Analog and Digital Forms** **1.10 Advantages and Disadvantages of the Analog and Digital Forms** **Solved problems** **Quiz 1** **Quiz 2**	1 2 3	2 hrs 2 hrs 2 hrs
Chapter 2 **2.1 Computer in Imaging Nuclear Medicine** **2.2 Pulse-Height Analyzer** **2.3 Digital Image Formats in Nuclear Medicine** **2.4 Nuclear medicine computers are used for:** **(1) The Data Acquisition,**	4	2 hrs

(2) Data Storage. **(3) Processing of Data.** **2.5 Formation of digital images.**	5 6	2 hrs 2 hrs
First Midterm Exam	7	2 hrs
2.6 Display, Conversion of a Digital Image into an Analog Video Signal. **2.7 Grayscale Cathode Ray Tube Monitors.** **2.8 Image Acquisition in Nuclear Medicine.** **Frame Mode (Static, dynamic, gated).** **2.9 List-mode acquisition.** **2.10 The advantage of list-mode acquisition.** **2.11 The disadvantage of list-mode acquisition.** **Solved problems.** **Quiz 1**	8 9	2 hrs 2 hrs
Chapter 3 **Information & Communication Technologies (ICT) and medicine** **3. 1-Patient records** **3. 2-Medical equipments** **3. 3-Research** **3.4-Web-based diagnosis** **3. 5-Expert systems** **3.6-Communications** **3.7 Computers and the disabled**	10 11	2 hrs 2 hrs
Chapter 4 **Digital Image Processing** **4.1 Function of Image Processing** **4.2 General Areas of Image Processing** **4.3 Clipping** **I-Point Operations** **II-Look-Up Table (LUT)** **4.4 Contrast Point Operation** **4.5 Image Processing in Nuclear Medicine** **Brightness of Image** **Image Contrast** **Image Contrast Differences** **4.6 Histograms** **Image Histogram** **4.7 Region or ROI (region of interest)** **4.8 Image Histogram Operations** • **Histogram Stretching** • **Histogram Sliding** • **Histogram equalization** • **Other Histogram Information** **4.9 Local Operations** **Convolution ((kernel)** • **(1) Low Pass Filter**	12 13 14	2 hrs 2 hrs 2 hrs

• **(2) High Pass Filter** **4.10 Smoothing Filters** **(1) Linear Smoothing Filters** **(a) Mean Or Average Filter** **(b)Gaussian Smoothed Filter** **(2) Non-linear Smoothing Filters** **(a) Median Filter** **4.11 Enhance Filters** **A-Edge enhancement** **B-Edge detection** • **(a) Directional Edge Detection** • **(b) Laplacian Edge Detection** • **(c) Sobel Edge Detection** • **(d) Prewitt Edge Detection** **Revision**		
Second Midterm Exam	15	2 hrs

2 Course components (total contact hours per semester):

Lecture: **15** (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **30 hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

j. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:

1. Identify Storage and transfer of data in computers number systems
2. Describe Decimal form (Base 10)
3. Binary form
4. Identify the Conversions between decimal and binary forms
5. List Digital Representation of Data Bits, Bytes, and Words

6. State Digital Representation of Different Types of Data
7. Describe Storage of Positive Integers
8. Identify Binary Representation of Signed Integers
9. Describe Analog Data And Conversion Between Analog and Digital Forms
10. list Advantages and Disadvantages of the Analog and Digital Forms.

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important microorganisms in different applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

(i) Cognitive skills to be developed

Having successfully completed the course students should be able to:

1. Diagram General Areas of Image Processing.

2. Differentiate between Clipping, Point Operations and Look-Up Table (LUT).

3. Evaluate Image Processing in Nuclear Medicine.

4. Differentiate between Histogram Stretching, Histogram Sliding, Histogram equalization, Other Histogram Information.

5. Analyse low pass filter and high pass filter.

6. Explain linear smoothing filters and non-linear smoothing filters.

7. Interpret the effect of Directional Edge Detection, Laplacian Edge Detection, Sobel Edge Detection and Prewitt Edge Detection on image details.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(xi) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(xii) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

23. Enhancing the ability of students to use computers and internet.
24. Interpret image pre-processing data
25. Use effectively image processing package to enhance the obtained image.
26. Know how to write a report.

27. Teaching strategies to be used to develop these skills

28. Homework (preparing a report on some topics related to the course depending on web sites).

29. Seminars presentation

30. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

22. Evaluation of presentations

23. Evaluation of reports

24. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

N. A

(ii) Teaching strategies to be used to develop these skills

- Follow up students the students in lab and during carryout all microbiological techniques

31. **Methods of assessment of students psychomotor skills**

- N. A

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	11th week	15%
5	Assay	15th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

8. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

1- Irene Joos Introduction to Computers for Healthcare Professionals Jones & Bartlett Publishers 2005.

2- William R. Hendee & E. Russell Ritenour"Medical imaging physics" Wiley 2002

Recommended Reading List

Electronic Materials, Web Sites
(eg. Web Sites, Social Media, Blackboard, etc.)

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Khaled Elbanna**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Hosam Salaheldin Ibrahim	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

Level 7

403495-4 Nuclear Medicine

403492-4 Medical radiation Physics II

403493-3 Physics of radiation thearapy II

403496-3 Physics 0f Biomaterial

403370-3 Solid State Physics I

102101-2 The Bibography of Prophet Muhammed (PBUH)

605401-2 The Holy Quraan IV

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Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title **Physics of Nuclear Medicine,**

Course code: **403280-4**

Dr Ramadan Ali Hassan

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

Course title : Physics of Nuclear Medicine **Course code: 403280-4**
2. Credit hours: 4 Cr. (1 + 3 Lab)
3. Program(s) in which the course is offered. : B.Sc Medical Physics
7. Name of faculty member responsible for the course: Dr Ramadan Ali Hassan
5. Level/year at which this course is offered: 7th level **/Forth year**
6. Pre-requisites for this course (if any): **Physics of medical imaging (1) / Code: 403389-3**
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

. 1. What is the main purpose for this course?

Physical principles of radioisotopes used in medicine and biology and operation of related equipment, lecture include;

1 Basic Nuclear Medicine Physics,
2 Formation of Radionuclides,
3 Nonscintillation Detectors,
4 Nonimaging Scintillation Detectors,
5 Imaging Instrumentation,
6 Radioisotopes medical applications
7 Nuclear medicine imaging
9 Quality Control
10 Radiation protection in nuclear medicine

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1 Topics to be Covered :-		
Topics	No of Weeks (Studying Week No.)	Contact hours
Topics	**2 weeks (Week 1& 2)**	**6 hrs**
1- Basic of Nuclear Medicine Physics,		
- Isotopes, Isotones, and Isobars		
- Radioactive transformations		
- Radioactivity		
- Half & average life		
Solved problems, Quizzes and homework exercises		
2 Formation of Radionuclides,	**2 weeks (Week 3 &4)**	**6 hrs**
Production & properties of Radio-Isotopes		
Methods of Production		
- Radioisotopes Generators		
- -Transient & Secular equilibrium		
- Cyclotron		
Nuclear reactors		
Solved problems, Quizzes and homework exercises		
3 Nonscintillation Detectors,		
1- Gas-Filled Detectors (Theory, Principles) Characteristics of the Major Voltage Regions		

Types of Gas-Filled Detectors (Ionization Chambers , Proportional Counters , Geiger Counters)	**2 weeks (Week 5 & 6)**	**6 hrs**
3- Semiconductor Detectors		
2- Photographic Detectors		
Solved problems, Quizzes and homework exercises		
First Periodic Exam	**Week 7**	
MIDDLE TERM VACATION	**Week 8**	
4 Nonimaging Scintillation Detectors,	**1 week (Week 9)**	**3 hrs**
- Structure and Characteristics of the Crystal Scintillation Detector		
- Sodium Iodide Detector Energy Spectrum		
- Other Peaks in the Energy Spectrum of the Source		
Types of Crystal Scintillation Detectors		
Solved problems, Quizzes and homework exercises		
5 Imaging Instrumentation,	**2 week (Week 10&11)**	**6 hrs**
- Radiation Scanners & Gamma camera		
- Positron emission tomography		
Solved problems, Quizzes and homework exercises		
6 Radioisotopes medical applications	**1 weeks (Week 12)**	**3 hrs**
Uses of Radioisotopes in The Study Of Metabolic pathway		
- Radioimmunoassay (RIA)		
- Radiotherapy		
Solved problems, Quizzes and homework exercises		
9 Quality Control 10 Radiation protection in nuclear medicine	**1 week (Week 13)**	**3 hrs**
Nonimaging Devices (Dose Calibrator, Survey Meters ,Crystal Scintillation Counters)		
Imaging Devices (Planar Gamma Camera)	**1 week (Week 14)**	**3 hrs**
Limiting of External & Internal Exposure		
Second Periodic Exam		
Final Practical Exam		
	(Week 15)	**2hrs**
	(Week 16)	**2hrs**

2 Course components (total contact hours per semester):			
Lecture 36 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **18 hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

k. Knowledge : Description of the knowledge to be acquired

knowledge that students should know and understand. ***At the end of the programme the student should be able to:***

1 Understanding the outlines of the Physics of nuclear medicine

b. Cognitive Skills

- estimate mathematical and physical formulas to solve problems in Physics of nuclear medicine and related fields of studies
- interpret the data obtained from QC of instruments

- integrate information technology (IT) based solution into Physics of nuclear medicine different fields effectively..

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(xii) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(xiii) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

28. Enhancing the ability of students to use computers and internet.
29. Interpret image pre-processing data
30. Use effectively image processing package to enhance the obtained image.
31. Know how to write a report.

32. Teaching strategies to be used to develop these skills

32. Homework (preparing a report on some topics related to the course depending on web sites).
33. Seminars presentation
34. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

25. Evaluation of presentations

26. Evaluation of reports

27. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

- N. A

(ii) Teaching strategies to be used to develop these skills

- - N. A

35. **Methods of assessment of students psychomotor skills**

- N. A

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	Exercises & Home works+ quizzes	All weeks	5%
	Assay	15th week	5%
2	Laboratory	All weeks	20 %
3	Written Test (1)	6th week	10%
4	Written Test (2)	11th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

9. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

1. Rachel A. Powsner, Edward R. Powsner "Essential Nuclear Medicine Physics" Blackwell Publishing Ltd 2006
2. Peter F. Sharp, Howard G. Gemmell and Alison D. Murray "Practical Nuclear Medicine 3rd add." Springer–Verlag London Limited 2005
3. Simon Cherry, Michael E. Phelps "Physics in Nuclear Medicine" 3rd add," Saunders 2003

- Michael E. Phelps "PET physics, instrumentation, and scanners second edition"2006 Springer Science.

2- Habib Zaidi "Quantitative Analysis in Nuclear Medicine Imaging" Springer, 2006.

Electronic Materials, Web Sites

(1- Journal of nuclear medicine technology; http://tech.snmjournals.org/

2- Journal of nuclear medicine ; http://jnm.snmjournals.org/

3-Journal of medical physics ; http://www.jmp.org.in/md.asp

http :// www.springer.com

- http:// www.sciencedirect.com

-http:// www.gigabedia .org

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries

• Open discussion in the class room at the end of the lectures
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 movies. • Coupling the theoretical part with laboratory part • Periodical revision of course content.
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr Ramadan Ali Hassan	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

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Kingdom of Saudi Arabia

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COURSE SPECIFICATION

Course title **Medical radiation physics II**

Course code: **4-403492**

Dr. Taha Alfawwal

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

Course title : Medical radiation physics II **Course code: 4-403492**
2. Credit hours: 4 hrs
3. Program(s) in which the course is offered. : B.Sc Medical Physics
8. Name of faculty member responsible for the course: **Dr. Taha Alfawwal**
5. Level/year at which this course is offered: 7th level
6. Pre-requisites for this course (if any): **Medical radiation physics I** , (403385-4)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

. 1-**acquire** basics of exposures by cosmic radiation and cosmogenic radionuclides , origin and kinds of cosmic radiation , exposures by cosmic radiations and, terrestrial radiations
2-Acquire the basic of the radiation pprotection quantities and units, and operational quantities.
3-**Calculate** the entrance skin dose for patients undergoing diagnostic X-ray machines using Cal dose software and a mathematical calculations
4-Describe types of phantoms of the human body
5- acquire information about occupational exposures and Environmental source geometries
6- **List** the différents route of radionucléides intime
7-Calculate the internal dose using Médical Interna Radiation Dose, MIRD method.
8- acquire procedure of direct measurement of internal dosimetry
9- **describe** the methods for decontamination

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

This course is interested in studying how the internal and external radiation doses and different ways to measure the radiation doses and the study of the nature of the radioactive contamination and how to remove them measure

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
Exposures from natural and man-made radiation sources Exposures by cosmic radiation and cosmogenic radionuclides Origin and kinds of cosmic radiation	Week ***(week 1)***	3hrs
Exposures by cosmic radiations Terrestrial radiation External exposures	Week ***(week 2)***	3hrs
Internal exposures	Week ***(week 3)***	3hrs
Protection quantities Operational Quantities	Week ***(week 4)***	3hrs

Dosimetric models Models and phantoms of the human body Idealized geometries representing occupational exposures	Week ***(week 5)***	3hrs
Environmental source geometries Methods of calculating protection quantities in computational models Occupational exposure and Environmental exposure	Week ***(week 6)***	3hrs
First Periodic Exam	Week ***(week 7)***	3hrs
Medical Term Vacation	Week ***(week 8)***	
Absorption through intact skin , Systemic behaviour of radionuclides, Excretion	Week ***(week 9)***	3hrs
- Internal dosimetry of radionuclides	Week ***(week 10)***	
Biokinetics of radionuclides in the body, Inhalation, Ingestion , Embryo and foetus, Transfer in maternal milk	Week ***(week 11)***	3hrs
Dose rate per unit activity, S-factor	Week ***(week 12)***	
MIRD Method for internal dosimetry	Week ***(week 13)***	3hrs
Methods of individual monitoring **Decontamination**	Week ***(week 14)***	3hrs
Second examination 1	Week ***(week 15)***	
Final examination	Week ***(week 16)***	

2 Course components (total contact hours per semester):			
Lecture 36 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: 18 **hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

l. Knowledge : Description of the knowledge to be acquired

knowledge that students should know and understand. ***At the end of the programme the student should be able to:***

1- outline the sources if natural background radiation .
2- list the types of e**xposures from natural and man-made radiation sources**
3- define the external and internal exposure s .
4- acquire basics of exposures by cosmic radiation and cosmogenic radionuclides , origin and kinds of cosmic radiation , exposures by cosmic radiations , terrestrial radiation and external exposures
5- state radiation protection quantities and units,.
6- describe different types of phantoms.
7- list the differents route of radionuclides intake and deposition percentage respiratory tract system.
8- name the basics of medical internal radiation dosimetry in nuclear medicine
10- describe a way of contamination and decontamination

b. Cognitive Skills

b1. estimate the internal effective dosses for organs in nuclear medicine and related fields of studies
b2. justify the mathematical expressions in calculating the external and internal doses due to external and internal exposure.
b3. integrate information technology (IT) based solution into radiation dose

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

.

(xiii) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(xiv) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

33. Enhancing the ability of students to use computers and internet.
34. Interpret image pre-processing data
35. Use effectively image processing package to enhance the obtained image.
36. Know how to write a report.

37. Teaching strategies to be used to develop these skills

36. Homework (preparing a report on some topics related to the course depending on web sites).

37. Seminars presentation

38. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

28. Evaluation of presentations

29. Evaluation of reports

30. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

- N.A

(ii) Teaching strategies to be used to develop these skills

- N. A

39. **Methods of assessment of students psychomotor skills**

- N. A

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	Exercises & Home works+ quizzes	All weeks	5%
	Assay	15th week	5%
2	Laboratory	All weeks	20 %
3	Written Test (1)	6th week	10%
4	Written Test (2)	11th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

10. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

1. H.Cember " introduction to health physics: 4th edition, 2009

2-John R. Cameron & James G. Skofronick "Medical physics" Willy John 1988

3. Simon Cherry, Michael E. Phelps "Physics in Nuclear Medicine" 3rd add," Saunders 2003

4. . Radiation physics for medical physicists Ervin B. Podgorsak Springer 2006.

Electronic Materials, Web Sites

(eg. Web Sites, Social Media, Blackboard, etc.) http://www.IAEA.com, http://ICRP.com, http://NCRP..com., http://ICRU.com, http://UNSCAR.com, http://ANSI.com, http://WHO.com

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Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies. • Coupling the theoretical part with laboratory part • Periodical revision of course content.
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Taha Alfawwal	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

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Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title **Physics of Radiotherapy2**

Course code: **403494-3**

Prof. Dr. Faiz Alghoribi

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

9. Course title : **Physics of Radiotherapy**2 **10.** Course code: **403494-3**
2. Credit hours: 3 Cr.
3. Program(s) in which the course is offered. : B.Sc Medical Physics
11. Name of faculty member responsible for the course: **Prof. Dr. Faiz Alghoribi**
5. Level/year at which this course is offered: 7 level /forth year
6. Pre-requisites for this course (if any): Physics of radiotherapy-1 **Code: 403386-4**
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

For students undertaking this course, the aims are to:

1-Classify imaging systems according to different criteria.
2-Distinguish between different image modalities used in radiotherapy.
3-Explain the basis of imaging using x-rays and γ-rays;
4-Outline the physical factors involved in imaging modalities using ionizing radiation;
5-Describe the use of magnetic imaging MRI in radiotherapy
6- Define different sophisticated techniques used in Radiotherapy.
7-Explan the treatment planning process using 3D conformal therapy and the dose computation algorithms.
8-Describe the technique of (IMRT&Stereotactic radiosurgery)
7-Understand the benefit of using proton beam therapy
8-Describe the methods of Total body irradiation and total skin electron irradiation
9- Understand how to use sealed radioactive sources in brachytherapy

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

This course interested in subjects such as Ionizing radiation use in radiation therapy to cause controlled biological effects in cancer patients. Physics of the interaction of the various radiation modalities with body-equivalent materials, and physical aspects of clinical applications.
Physics of ionizing radiation therapy using photon and particles with emphasis on external and internal beam dosimetry and treatment planning.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

1 Topics to be Covered :-		
Topics	No of Weeks	Contact hours
(1)Imaging for Treatment Planning 1.Computed Tomography 2. Magnetic Resonance Imaging (MRI) 3. Ultrasound 4. Proton Emission Tomography 5. Planar Radiography	1 week (2)	3hrs
(2)Magnetic Resonance Imaging in Treatment Planning 1.Principles of Magnetic Resonance Imaging 2. Rationale for the use of Magnetic Resonance Imaging in treatment planning 3.Problems with the use of Magnetic Resonance Imaging in treatment planning. 4.Methods to allow the use of Magnetic Resonance Imaging in treatment planning. 5. Clinical sites of Magnetic Resonance Imaging application in treatment planning.	**2 weeks (3,4)**	**6 hrs**

(3)Three-Dimensional Conformal Radiation Therapy 1.Treatment Planning Process 2.Dose Computation Algorithms.	**1 weeks (5)**	**3 hrs**
First Mid Term Exam	**Week 6**	**2hrs**
(4) Intensity Modulated Radiation Therapy (IMRT) 1.IMRT Therapy Planning 2. IMRT Delivery 3. Commissioning of IMRT 4. Dose Calculation Algorithms 5. Clinical Application	**2week (7,8)**	**7 hrs**
(5) Stereotactic Radiosurgery (SRS) 1. Stereotactic Radiosurgery techniques 2. Dosimetry 3. Dose Calculation Algorithms 4. Quality Assurance. 5. Clinical Application.	**1week (9)**	**3 hrs**
(6) Proton Beam in Radiotherapy 1.Physical Basis: The interaction of Proton with Matter 2. Technological Basis of Proton Therapy 3.Treatment Implementation 4. Clinical Applications	**1 weeks (10,11)**	**4 hrs**
Second Mid-term Exam	**Week 12**	**2hrs**
(7) Total Body Irradiation 1. Clinical Goals 2.Dose and Dose Rate 3.Dose Specification 4.Available Techniques 5.Dosimetry Considerations	**1 week (13)**	**3 hrs**
(8) Total Skin Electron Irradiation 1.General Clinical and Patient-Related Problems 2.Physical and Practical Requirements	**1 week (14)**	**3 hrs**

(9) High Dose Rate Brachytherapy 1. High Dose Rate Unit 2.Licensing Requirements 3. High Dose Rate Source Calibration. 4. Treatment Planning 5. Quality Assurance 6. Clinical Application	**1 week (15)**	**3hrs**

2 Course components (total contact hours per semester):			
Lecture 36 (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **20hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

m. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:

-1-Classify imaging systems according to different criteria.
2-Distinguish between different image modalities used in radiotherapy.
3-Explain the basis of imaging using x-rays and γ-rays;
4-Outline the physical factors involved in imaging modalities using ionizing radiation;
5-Describe the use of magnetic imaging MRI in radiotherapy
6- Define different sophisticated techniques used in Radiotherapy.
7-Explan the treatment planning process using 3D conformal therapy and the dose computation algorithms.
8-Describe the technique of (IMRT&Stereotactic radiosurgery)

7-Understand the benefit of using proton beam therapy
8-Describe the methods of Total body irradiation and total skin electron irradiation
9- Understand how to use sealed radioactive sources in brachytherapy

(ii) Teaching strategies to be used to develop that knowledge

- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. Students will be given opportunity to understand the role of important medical physics in different medical applications and human service.
- At the end of the program, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course.
- All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions.
- Using images and movies
- Encouraging students to collect the new information about what the new in computer in medicine.
- Enable the reference books and scientific sites concerning bacteriology in internet.

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

compare between different type of external radiotherapy and its applications.
Solve the problem related to the calculation of dose to the patient using different types of techniques.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
-Brain storming
-Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

(xiv) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(xv) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

38. Enhancing the ability of students to use computers and internet.
39. Interpret image pre-processing data
40. Use effectively image processing package to enhance the obtained image.
41. Know how to write a report.

42. Teaching strategies to be used to develop these skills

40. Homework (preparing a report on some topics related to the course depending on web sites).
41. Seminars presentation
42. Field visits to factories

(iii) Methods of assessment of students numerical and communication skills

31. Evaluation of presentations

32. Evaluation of reports

33. Practical exam

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

NA

(ii) Teaching strategies to be used to develop these skills

- -N. A

Methods of assessment of students psychomotor skills

- N. A

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	12th week	15%
5	Assay	15th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

1.Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

Recommended Reading List

(1) Faiz.M.Khan" the physics of radiation therapy"3rd ed.by Lippincott Williams&Wilkins 2003

(2)Philip Mayles,Alan Nahum"handbook of radiotherapy physics:theory and practice" Taylor&Francis 2007

(3)) Faiz.M.Khan "Treatment Planning in radiation Oncology" 2nd aedition,Lippincott Williams&Wilkins 2007.

(4)Podgorsal.E.B."Radiation Oncology Physics:a handbool for teachers and students "international Atomic energy agency,Vienna,2005

(5)Cherry P.Duxbury A."Practical Radiotherapy Physics and Equipment"Greenwich Medical Media Limited 1998

(6) Brady L.W.& Heilmann H.P.:Medical Radiology radiation Oncology"Springer 2006.

Electronic Materials, Web Sites
(eg. Web Sites, Social Media, Blackboard, etc.)

http :// www.AAPM.org

http:// www.sciencedirect.com

(1) International atomic energy agency (IAEA) reports

(2) American Association of physicist in medicine (AAPM) reports and journals

(3) National Council on Radiation Protection & Measurements (NCRP)

(4) International Commission on Radiation Unit & measurements(ICRU)

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Taha Alfawwal**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Questionaries • Open discussion in the class room at the end of the lectures
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 movies. • Coupling the theoretical part with laboratory part • Periodical revision of course content.
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Aida Radwan	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

- **نماذج من الاختبارات الدورية والنصفية والنهائية**

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقويـم
والاعـتـمـــاد الأكـاديـمـــي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title Physics of Biomaterial

Course code: 403389

Dr. Ahmed Mohamed Alhadi

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. **Course title: Physics of Biomaterial** 2. **Course code: 403389**
2. Credit hours: 3 hr
3. Program(s) in which the course is offered. : B.Sc Medical Physics
3. **Name of faculty member responsible for the course:** **Dr. Ahmed Mohamed El-Hadi**
5. Level/year at which this course is offered: 5th Year / Level 7
6. Pre-requisites for this course (if any): Solid state physics (403389-3)
7. Co-requisites for this course (if any): ---
8. Location if not on main campus: Main campus

B Objectives

After completing this course student should be able to:

6. Define Type of Bio materials, Properties of biomaterials: Physical, thermal, electrical and optical properties of bio-materials and their application to processing
7. Explain Biomaterials Uses in medical .
8. Describe Polymers for Medical applications
9. Explain strategy of the course in the beginning of the semester
10. Outlines of the physical laws, principles and the associated proofs.
11. Highlighting the day life applications whenever exist.
12. Encourage the students to see more details in the international web sites and reference books in the library.
13. Discussing some selected problems in each chapter.
14. Cooperate with different institution to find how they deal with the subject
15. Renew the course references frequently
16. Frequently check for the latest discovery in science

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

The Biomaterials course is divided into four sections: macromolecular polymer & material science, physical characterization & properties,.
Biomaterials will concentrate on fundamental principles in biomedical physics and material science. This course uses a combination of lectures and student presentations, self-directed learning to examine the structure and properties of hard materials (ceramics, metals) and soft materials (polymers, hydrogels). Specifically, the class will be divided into two parts: (I) Biomaterial Science and Engineering, (II) and Polymers

1 Topics to be Covered

Topic	No of Weeks	Contact hours
Chapter 1 Introduction to Medical Biomaterials: Type of Bio materials, Properties of biomaterials: Physical, thermal, electrical and optical properties of bio-materials and their application to processing **Solved problems** **Quiz 1** **Quiz 2**	1-3	9 hrs 2 hrs

Chapter 2 Novel Biomaterials Uses in medical: Biodegradable materials, Hydrogels, self-assembling peptides, Implants materials, Metallic implant materials, stainless steels, co-based alloys, Ti based alloys, ceramic implant materials, aluminum oxides, hydroxyapatite, glass, ceramics, and carbons **Solved problems.** **Quiz 3**	4-6	9 hrs
First Midterm Exam	7	2 hrs
Chapter 3 Polymers for Medical applications: Polymeric implant, Polymers for drug delivery: types of polymer, pharmaceutical polymers. physicochemical properties of polymers and relationship with structure, properties, kinetics, mechanisms and applications and Materials Nanostructure Devices (DNA-templated and nanowires).	8-12	18 hrs
Chapter 4 **Hydrogels** Natural vs. Synthetic Hydrogels Hydrogels as Tissue Engineering Matrices Preparation of Hydrogels	13-15	6 hrs
Second Midterm Exam	15	2 hrs

2 Course components (total contact hours per semester):			
Lecture: **15** (Credit Hrs)	Tutorial: ------	Practical/Fieldwork/Internship:	Other: **30 hrs**

3. Additional private study/learning hours expected for students per week. (This should be an average :for the semester not a specific requirement in each week): 12h (reports & essay)

4. Development of Learning Outcomes in Domains of Learning

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.

n. Knowledge : Description of the knowledge to be acquired

Upon successful completion of this course The student will be able to:

11. Define Type of Bio materials, Properties of biomaterials: Physical, thermal, electrical and optical properties of bio-materials and their application to processing
12. Explain Biomaterials Uses in medical .
13. Describe Polymers for Medical applications
14. Explain strategy of the course in the beginning of the semester
15. Outlines of the physical laws, principles and the associated proofs.
16. Highlighting the day life applications whenever exist.
17. Encourage the students to see more details in the international web sites and reference books in the library.
18. Discussing some selected problems in each chapter.
19. Cooperate with different institution to find how they deal with the subject
20. Renew the course references frequently
21. Frequently check for the latest discovery in science

(ii) Teaching strategies to be used to develop that knowledge

- Demonstrating the basic information and principles through lectures and the achieved applications
- Discussing phenomena with illustrating pictures and diagrams
- Lecturing method:
- Projector
- Power point
- e-learning
- Tutorials
- Revisit concepts
- Discussions
- Brain storming sessions
- Start each chapter by general idea and the benefit of it
- Learn the student background of the subject;
- Show the best ways to deal with problem;

Keep the question "why" or "how" to explain always there

(iii) Methods of assessment of knowledge acquired:

- The assessment of these skills is implicit in all forms of assessment, but is not explicitly measured. The overall degree of success achieved by each student reflects the extent to which these skills have been acquired. The project work and growing in complexity as the student progresses, are assessed to explicitly measure the acquisition of the ability to handle experimental equipment, plan measurements in a logical fashion, analyse the results produced and communicate them through printed and verbal media.

b. Cognitive Skills

Preparing main outlines for teaching, Following some proofs, Define duties for each chapter , Home work assignments, Encourage the student to look for the information in different references, Ask the student to attend lectures for practice solving problem, Doing small research, Learn how to search the internet and use the library. Learn how to summarize lectures or to collect materials of the course. Learn how to solve difficulties in learning: solving problems – enhance educational skills.

(ii) Teaching strategies to be used to develop these cognitive skills:

- Lectures
- -Discussion

(iii) Methods of assessment of students cognitive skills

- Exam must contain questions that can measure these skills.
- Quiz and exams
- Discussions after the lecture

c. Interpersonal Skills and Responsibility

At the end of the course, the student will be able to:

- work effectively in a group to make a decision.

-Analyse obtained data and how to manage it.

-make a certain decision fast especially during data acquisition.

(xv) Teaching strategies to be used to develop these skills and abilities

- Lab work
- Case Study
- Active learning
- Small group discussion

(iii) Methods for assessment of the students interpersonal skills and capacity to carry responsibility

- Evaluate the efforts of each student in preparing the report.
- Evaluate the scientific values of reports.
- Evaluate the work in team
- Evaluation of the role of each student in lab group assignment
- Evaluation of students presentations

d. Communication, Information Technology and Numerical Skills

(xvi) Description of the skills to be developed in this domain. At the end of the course, the student will be able to:

(xvii) Know the basic mathematical principles.
(xviii) Use the web for research.
(xix) Discuss with the student.
(xx) Exams to measure the mathematical skill.
(xxi) Clear the weakness point that should be eliminated.
(xxii) Encourage the student to ask for help if needed.
(xxiii) Computational analysis.
(xxiv) Data representation.
(xxv) Focusing on some real results and its physical meaning.
(xxvi) Lectures for problem solution.
(xxvii) Encourage the student to ask good question to help solve the problem
(xxviii) Know how to write a report.

43. Teaching strategies to be used to develop these skills

43. Homework (preparing a report on some topics related to the course depending on web sites).

44. Seminars presentation

(iii) Methods of assessment of students numerical and communication skills

34. Evaluation of presentations

35. Evaluation of reports

e. Psychomotor Skills (if applicable)

At the end of the course, the student will be able to:

- N. A

(ii) Teaching strategies to be used to develop these skills

- N. A

45. **Methods of assessment of students psychomotor skills**

- N. A

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	Exercises & Home works	All weeks	5 %
2	Participation	All weeks	5 %
3	Written Test (1)	6th week	15%
4	Written Test (2)	11th week	15%
5	Assay	15th week	10%
6	Final Exam (theoretical)	16th week	50%

D. Student Support

11. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Office hours: 10 hrs

E. Learning Resources

Required Text(s):

1. BlOMATERIALS SCIENCE : An Introduction to Materials in Medicine, Edited by Buddy D. Ratner and Allan S. Hoffman.
2. **BIOMATERIALS APPLICATIONS FOR NANOMEDICINE**, Edited by **Rosario Pignatello**

Recommended Reading List

Electronic Materials, Web Sites
(eg. Web Sites, Social Media, Blackboard, etc.)

Other learning material such as computer-based programs/CD, professional standards/regulations

- **PPT prepared by Associate prof. Dr. Ahmed El-Hadi**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Class room is already provided with data show
- The area of class room is suitable concerning the number of enrolled students (68) and air conditioned.

2. Computing resources

- Providing class rooms with computers and labs with data show.

3.Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

- Availability of some reference bacterial strains
- Availability different specific media and chemicals used for isolation.

G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures

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 movies.
- Coupling the theoretical part with laboratory part
- Periodical revision of course content.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- After the agreement of Department and Faculty administrations

5 Describe the planning arrangements for periodically reviewing course effectiveness and

planning for improvement.

- Periodical revision by Quality Assurance Units in the Department and institution

Faculty member responsible for the course:

Prepared by faculty staff: Dr. Ahmed Mohamed El-Hadi	**Signature:**
Date Report Completed: 2015	
Revised by: **Physics Department council**	**Signature:**
Date: 2015	
Program Chair **Dr. Hatem Alomri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	

مرفقات:

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقـويـم
والاعـتـمـــاد الأكـاديـمـــي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title: Solid State Physics I

Course code: 403370-3

Dr. Mehrez LOULOU

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

1. Course title : **Solid State Physics I** Course code: **403370-3**
2. Credit hours: 3 Cr.
3. Program(s) in which the course is offered. : B.Sc Medical Physics
4. Name of faculty member responsible for the course: **Dr. Mehrez Loulou**
5. Level/year at which this course is offered: 7 level /forth year
6.Pre-requisites for this course (if any): Solid State Physics I **Code: 403386-4**
6. Co-requisites for this course (if any): ---
7. Location if not on main campus: Main campus

Course Specifications

Institution	Date of Report
Umm AL-Qura University	**Revised Safar 1437 H**
College/Department : **Science /Physics**	

A. Course Identification and General Information

1. Course title and code: **Solid State Physics I /Code : 403370-3**
2. Credit hours:**3**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) **Physics Department**
4. Name of faculty member responsible for the course : **Prof. Dr. Yosry Moustafa, ymmoustafa@uqu.edu.sa** **Dr. Mehrez LOULOU, mehrezl@yahoo.fr**
5. Level/year at which this course is offered : **6h level**
6. Pre-requisites for this course (if any): **403344**
7. Co-requisites for this course (if any):
8. Location if not on main campus**: within the university campus**

9. Mode of Instruction (mark all that apply)

a. Traditional classroom	√	at percentage?	70%
b. Blended (traditional and online)	√	at percentage?	15%
c. e-learning	√	at percentage?	15%
d. Correspondence		at percentage?	

Comments:

B Objectives (hyper link of Medical physics plan)

After completing this work the student must be: •
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 introduction for Solid State Physics, principles and the associated proofs. 3. Encourage the students to see more details in the international web sites and reference books in the library. 4. Discussing some selected problems in each chapter. 5. Cooperate with different institution to find how they deal with the subject 6. Renew the course references frequently 8- Joining between the theoretical and industrial applications 9- Frequently check for the latest discovery in science

C. Course Description(Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
List of Topics	No of Weeks	Contact hours
1-Crystal Structure: Classification of Solids, the Crystalline State, Some Basics Definitions, Symmetry Operations, Two-Dimensional and Three Dimensional Lattice Types,	**(week 1)**	3hrs
Positions and Directions of Planes in the Crystal, Some Simple Crystal Structures, Non-Crystalline Solids.	**(week 2)**	3hrs
2-Crystal Binding: Binding Energy in Solids, Types of Binding.	**(week 3)**	3hrs
3-Crystal Diffraction: X-ray Diffraction and Bragg's Law, Laue Formulation for x-ray diffraction,	**(week 4)**	3hrs
Diffraction Directions, Experimental Methods for Diffraction.	**(week 5)**	3hrs
1st Periodic Exam	**(week 6)**	3hrs
4-Defects in Crystals: Point Defects, Thermal Consideration in Formation Energy, Dislocations, Types of Dislocations, Planar Defects.	**(week 7)**	3hrs
5-Lattice Vibrations and Some Thermal Properties: Vibrations of a One-Dimensional Mono-atomic and Diatomic Chains, Phonons,	**(week 8)**	3hrs
Lattice Specific Heat, the Classical Model, Einstein Model, Debye Model, the Thermal Conductivity.	**(week 9)**	3hrs
6- Free Electrons in Metals: The Electrical and Thermal Conductivities, The Resistivity, the Quantum Theory of Free Electrons,	**(week 10)**	3hrs
Ground State Property of the Free Electron Gas, Electronic Specific Heat of Metals, Hall Effect in Metals, Some Problems (Drawbacks) with the Free Electron Model.	**(week 11)**	3hrs

2nd Periodic Exam	**(week 12)**	3hrs
7-Band Theory in Solids: Origin of Bands in Solids, Periodic Potential, Bloch Function, Crystal Structure in a One-Dimensional Atomic Chain, Brillouin Zone,	**(week 13)**	3hrs
Bands Theory in the Free Electron Model, Density of States, The Effective Mass, The Concept of Hole, Fermi Surface.	**(week 14)**	3hrs
Final Exam	**(week 15)**	3hrs

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

Credit		Contact	Hours			Self-Study	Other	**Total**
	NCCCA	Lecture	Tutorial	Laboratory	Practical			
Code 403370-3	**3ch**	**36**	**12**	**0**	**0**	**72**	**15**	**135**

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

	NQF Learning Domains And Course Learning Outcomes	**Course Teaching Strategies**	**Course Assessment Methods**
1.0	**Knowledge**		
1.1	At the end of the program the student should be able to : 1- Know the crystal structure 2- List the crystal binding 3- Know the basics of crystal diffraction 4- Describe the defects in crystals 5- Know the lattice vibrations and some thermal properties. 6-Describe the free electrons in metals 7- Describe the band theory in solids	▪ Brainstorming. ▪ Cooperative learning. ▪ Dialogue and discussion. ▪ Learning. Self-learning.	1- Conducting scientific research and follow-up of advances in the field. 2- Quarterly tests. 3- of final assessment. 4- Duties and discussions within the lecture 5- Multiple choice knowledge item on final exam.
2.0	**Cognitive Skills**		

2.1	Cognitive skills to be developed 1. How to use physical laws and principles to understand the subject 2. How to simplify problems and analyze phenomena 3. Analyse and explain natural phenomena. 4. Represent the problems mathematically	**1.** Preparing main outlines for teaching **2.** Define duties for each chapter **3.** Homework assignments **4.** Encourage the student to look for the information in different references **5.** Ask the student to do small research.	1. Midterm's exam. Exams, short 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.
3.0	**Interpersonal Skills & Responsibility**		
3.1	Work in a group to conduct an experiment. Write a short report in specific subject related to the course materials by using advanced information and communication tools . Write a report individually or in a team using the library and the internet. Appraise the correctness of their solution, interpret their results and connect it to related areas of medical physics.	*Training students to build good relationships with their counterparts and collaborate with others and develop personal and professional performance through the following strategies:* ▪ *cooperative learning* ▪ *peer education* ▪ *Enhance confidence in the same student and encourage dialogue and discussion.*	*Students are assessed through:* ▪ *evaluation of field activities* ▪ *verbal tests* ▪ *assessment assignments* ▪ *style note* ▪ *Request solutions from each group in front of students.*
3.2	-justify the essential parts of a problem and formulate a strategy for solving the problem.	*- Raise the spirit of cooperation among students.*	*- The final evaluation of the collective tasks and discusses their students.*
4.0	**Communication, Information Technology, Numerical** skills		
4.1	1- Communication with others: the lecturer – students in the class 2. IT through: the Internet – computer skills 3. Numerical skills through: solving problems- computation – data	1. Use the web for research. 2. Discuss with the student. 3. Clear the weakness point that should be	1.Their interaction with the lectures and discussions. 2.The reports of different asked tasks. 3.Homework, Problem solutions assignment and exam should focus on the

	analysis – feeling physical reality of results.	eliminated. 4. Encourage the student to ask for help if needed. 5. Computational analysis. 6. Focusing on some real results and its physical meaning. 7. Lectures for problem solution. 8. Encourage the student to ask good question to help solve the problem 9. Display the lecture note and homework assignment at the web.	understanding. 4.Results of computations and analysis. 5.Comments on some resulting numbers. 6.Research.
5.0	**Psychomotor**		
5.1	Not applicable (**NA)**	Not applicable	Not applicable

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	Midterm 1	6th week	10 %
2	Midterm 2	12th week	10%
4	Homework + quizzes	During the semester	10%
5	Discussion	All the semester	10%
5	Final exam	End of semester	60 %

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)

E. Learning Resources

1. List Required Textbooks 1-Charles Kittel, Introduction to Solid State Physics 8th Ed , 2005, John Wiley & sons. 2-Introduction to Solid State Physics, H.P. Myers, 2nd Ed, 2009 Taylor & Francis. فيزياء الحالة الصلبة وتطبيقاتها (المرجع الشامل) تأليف يسري مصطفى و احمد الغامدي، جدة 2015-1346هـ.
2. List Essential References Materials (Journals, Reports, etc.).
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. None

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.) -The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of student not exceed on 30 in the classroom - Library
2. Computing resources (AV, data show, Smart Board, software, etc.) -Hall is equipped with a computer. - Provide overhead projectors and related items -Smart board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) None

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching Student evaluation electronically organized by the University.
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor -Revision developmental internal and external. - Student Assessment tests quarterly and final through questionnaires

-The colleagues who teach the same course discuss together to evaluate their teaching
3 Processes for Improvement of Teaching - The new follow-up, which was linked to the course or effective ways of teaching. - Create the right atmosphere for study. - Material and moral incentives. - Lecture developmental audit, or workshop lesson model - Course report, Program report and Program self-study. - A tutorial lecture must be added to this course.
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.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. - Consulting the other professors scheduled. - Hosting a visiting professor to evaluate the course. - Workshops with professor's course. - Reconsider the vocabulary scheduled every two years in order to cope with new developments -Student evaluation. - Course report. - Program report

Workload with respect to Topics to be Covered											
List of Topics	No. of Weeks	Contact Hours				Total of contact	Self-Study			Discussion	Total
		Lecture	Tutorial	Lab.	Office hours		Internet	Library	Homework		
1-Crystal Structure 2-Crystal Binding 3-Crystal Diffraction	5	15	5	0	5	25	5	10	10	6	56
Mid-term1	1										
4-Defects in Crystals 5-Lattice Vibrations and Some Thermal Properties 6- Free Electrons in Metals	5	15	5	0	5	25	5	10	10	6	56
Mid-term2	1										
7-Band Theory in Solids	2	6	2	0	2	10	2	4	4	3	23
Final exam	1										
Total	15	36	12	0	12	60	12	24	24	15	135

Level 8

403498-5 Traning Project

Kingdom of Saudi Arabia
National Commission for
Academic Accreditation &
Assessment

المملكـة العربيـة السعوديـة
الهيئـــة الوطنيـــة للتقويـم
والاعـتـمـــاد الأكـاديـمـــي

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course title: Solid State Physics I

Course code: 403370-3

Dr. Mehrez LOULOU

Revised Safar 1436 H

Revised 2015

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution: Umm AL – Qura University
College/Department : College of Applied Sciences – Department of Physics

A Course Identification and General Information

2. Course title : **Training Project** Course code: **403498-5**
2. Credit hours: 5 Cr. (5 hrs)
3. Program(s) in which the course is offered. : B.Sc Medical Physics
5. Name of faculty member responsible for the course: **Prof. Saud Allehyani**
5. Level/year at which this course is offered: 8 level
6.Pre-requisites for this course (if any): Solid State Physics I **Pre-requisite courses**
6. Co-requisites for this course (if any): ---
7. Location if not on main campus: Main campus

COURSE SPECIFICATIONS MPH, 403498-5

Institution: Umm AL-Qura University
College/Department :Faculty of Applied Science – Department of Physics

A. Course Identification and General Information

1.Course title and code: Training Project **2.Course code 403498-5**
3. **Credit hours:-5 Cr. (5 hrs)**
4. **Program(s) in which the course is offered.** **B.Sc. Medical Physics**
5. Name of faculty member responsible for the course **Prof. ALLEHYANI S. H**
6. Level/year at which this course is offered Level 8/ Fourth Year
7. Pre-requisites for this course (if any) Department Approval
8. Co-requisites for this course (if any) :
9. Location if not on main campus :- Main campus

B Objectives (hyper link of Medical physics plan)

1. Summary of the main learning outcomes for students enrolled in the course.

The course aims to give the students the chance to:

1- Understand the optimum basic technical X-ray operating conditions of different **diagnostic x-ray machines (X-rays, CT,fluoroscopy, and diagnostic, mammography) and** find how they deal with the patients
2- Understand basic technical operating conditions of preparation of radio isotopes in **nuclear medicine**
3- Understand basic technical operating conditions of Gamma camera and linear accelerator.
4- **Measure the dose out for X-ray machines, linear accelerators and CTDI for CT.**
5. **Practicing in how to do treatment Planning and Dose rate calculation**
1- Initialize the r**adiation protection medical practices**

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

3- Perform quality control for X-ray machines.
4- Measure the entrance skin doses for patients during different X-ray imaging.

C. Course Description (Note: General description in the form to be used for the Bulletin or handbook should be attached)

The course will cover the principle of different medical X-ray machines , diagnostic and radiotherapy machines.. This course will provide essentials of different medical imaging practices..

Topics to be covered		
Topics	No. Of Weeks	Contact hours
Practicing in how to make adjustment of an operating parameters of diagnostic X-ray machines	**3**	**75**
Practicing in how to dial with Radioactive isotopes Preparations	**3**	**75**
Practicing in how to do treatment Planning and Dose rate calculation	**3**	**75**
Practicing in how to protect the patients and Staff Dept form Radiation Hazard and how to use TLD badges	**3**	**75**
Practicing in how to define the Tumor and localize its position	**3**	**75**
Oral Presentation	**1**	**25**
	15 weeks	**325 hrs**

2 Course components (total contact hours per semester):			
Lecture :	**Tutorial:**	**Practical: 325 hrs**	**Other:**

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

Self study (web search, library, reports, homework, etc) **50hrs**

4. Development of Learning Outcomes in Domains of Learning

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.

a. Knowledge

knowledge that students should know and understand.

At the end of the course, the student should be able to:

a1. Understand the basic physical principles of different X-ray examinations.

a2. List the tools required for each quality control examination/

a3. Outline the merits and drawbacks of each diagnostic and therapeutic X-ray machines..

a4. Use an appropriate ion chamber that connect with non invasive KV meter to measure dose out put of different X-ray and linear accelerators machines.

(iv) Teaching strategies to be used to develop that knowledge

The strategies used to develop the above knowledge are as follows:-

- Demonstrating the basic information and principles through medical training
- Start each medical training practice by general idea and the benefit of it.
- Brain storming sessions.
- Discussions.
- Self learning

(iii) Methods of assessment of knowledge acquired

- Report
- Presentation
- Discussion

b. Cognitive Skills

Cognitive Skills that students should know and
at the end of the course the student should be able to:

b1. Interpret the quality control factors measurements of different X-ray examinations
b2. Compare between the properties of X-ray and CT.
b3. Generate reference dose levels for different X-ray instruments.

(ii) Teaching strategies to be used to develop these skills and abilities

- Using Cal-Dose program to calculate the entrance skin dose
- Group Discussion
- Encourage the student to look for the information in different references

(iii) Methods of assessment of Cognitive Skills

- Seminar

c. interpersonal skills and responsibility:

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed.
At the end of the course the student should be able to:
c1. Summarize the different procedures of imaging.
c3- justify the essential parts of different clinical situations and formulate a strategy for the optimum setup of each clinical situation.
Throughout the course the student well have the capacity for self-directed learning, and personal and social responsibility.

(ii) Teaching strategies to be used to develop these skills and abilities

Cooperation with a lot of hospitals in makkah, Jeddah,Taif and Riyadh

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

Assessment of group assignment includes component for individual contribution. Capacity for independent study assessed in individual assignments.

- Report

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain. ***At the end of the course the student should be able to:***

d1. Use software to calculate the out put doses of different modalities and treatment planning software
d2. Work in dependently and in group to represent a seminar about topic related to the study.
d3. Use internet to search for topics and writing reports
d4. Know the standards for writing a good report

(ii) Teaching strategies to be used to develop these skills ▪ Group seminar discussion ▪ Reports about different tasks
(iii) Methods of assessment of students numerical and communication skills ▪ Report assignment
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required **NA**
(ii) Teaching strategies to be used to develop these skills **NA**
(iii) Methods of assessment of students psychomotor skills **NA**

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
5	Reports (reports/training program)	End of the training project	70 %
5	oral presentation	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)

1- 3-visiting to the hospitals during the training project.

2- The contact with students by e-mail , an office hours and during presentations.

E. Learning Resources

1. Required Text(s)

2. Essential References

1- Medical Imaging Physics. W.R. Hendee&E.R. Ritenour, 2nd Eds, Wiley, 2002

2- Essential Nuclear Medicine Physics. R.A.Powsner&E.R.Powsner, 1st Eds, Blackwell publishing Ltd,2006.

3- PET Physics, Instrumentation and Scanners. M.E.Phelps, 2nd Eds., Springer,2006

4- Positron Emission Tomography. D.L.Bailey&D.V.Townsend, 1st Eds., Springer, 2005
3- Recommended Books and Reference: 1- Fundamentals of Medical Imaging Second Edition Paul Suetens Cambridge University Press 2009 2- Introduction to Medical Imaging Smith and A. Webb Cambridge University Press 2011.
4-.Electronic Materials, Web Sites etc http://www.excelmedicalimaging.com/ http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=6159236 http://www.nema.org/prod/med/
5- Other learning material such as computer-based programs/CD, professional standards/regulations Application of Cal-Dose program on some selected x-ray examinations

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.) -The number of students size of in the hospital room should be proportional to the X-ray room. - The number of student not exceed on 5 in the room - Library
2. Computing resources (AV, data show, Smart Board, software, etc.) -Hall is equipped with a computer. - Provide overhead projectors and related items -Smart board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) None

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • final presentations • Electronic student evaluation is organized by the university measurement and evaluation unit
2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor •
3 Processes for Improvement of Teaching • Using of interactive learning movies • Periodic updating of the 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 medical evaluation reports by others in the department.

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

8- - The following points may help to get the course effectiveness
   - Student evaluation
   - Course report
   - Program report
   - Program Self study report

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

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

Faculty member responsible for the course:

Prepared by faculty staff: 1.Prof. Allehyani S. H 2.Dr. Taha M. T	**Signature:**
Date Report Completed: 12/2015	
Revised by: 1. 2 3	**Signature:**
Date:22**.12.2015**	
Program Chair Dr.**Hatem Alamri**	**Signature:**
Dean **Prof. Samir Natto**	**Signature:**
Date:	