Module Specification Handbook for Medical Physics Program

Study Plan 1419

بسم الله الرحمن الرحيم

وقل اعملوا فسيرى الله عملكم ورسوله والمؤمنون

معالي مدير الجامعة
الدكتور بكري بن معتوق عساس

سعادة عميد الكلية
د. وليد بن جميل ألطف

سعادة وكيل الكلية
د./ حاتم الطس

سعادة وكيلة الكلية لفرع الطالبات
د/ رجاء معتوق

سعادة وكيل الكلية للتطوير الجامعي
الدكتور/ فهد الهاشمي

سعادة وكيل الكلية للشئون الاكاديمة
الدكتور/ حسين ابو الريش

سعادة وكيل الكلية للدراسات العليا
أ.د./ باسم حسين اصغر

سعادة وكيلة الكلية لشئون التعليم والتطوير
د/ بدرية الجحدلي

سعادة رئيس قسم الفيزياء
الدكتور صالح بن مرزوق اللقماني

سعادة وكيلة القسم لفرع الطالبات
الدكتوره/ زينب مطر

مقدمة

الحمد لله رب العالمين والصلاة والسلام على سيدنا ونبينا محمد وعلى آله واصحابه والتابعين الى يوم الدين

أنشئ قسم الفيزياء في عام **1385/1384** هـ الموافق **1965/1964**م، كتوأم لقسم الرياضيات، وذلك عندما صدرت أول لائحة لكلية التربية بجامعة الملك عبد العزيز شطر مكة المكرمة، وقد تخرجت عدة دفعات على نظام التخصص المزدوج (فيزياء ورياضيات).

استمر العمل على هذا النظام لمدة عشر سنوات، حتى عام **1395/1394**هـ حيث تم فصل قسم الفيزياء عن قسم الرياضيات، واصبح قسما قائما بذاته يمنح درجة البكالوريوس في الفيزياء والفيزياء الطبية.

و في عام **1397/1396**هـ، ادخل نظام الساعات المعتمدة على جامعة الملك عبد العزيز شطر مكة المكرمة، وأصبح القسم يقدم مقرراته وفقا لنظام الساعات المعتمدة. ويمنح درجة البكالوريوس في الفيزياء. وفى عام **1401/1400** هـ تأسست جامعة أم القرى بمكة المكرمة، ثم انشئت كلية العلوم التطبيقية واصبح القسم تابعا لها. وأصبح يمنح درجة البكالوريوس في الفيزياء و الفيزياء الطبية. و نقدم تاليا خطة **1419** كما يلى.........................

وفقنا الله وإياكم الى ما يحبه و يرضاه ،،،

قسـم الفيزياء

Umm Al-Qura University

Date : 22-10-2015

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Degree Plans

major : 40301 Medical Physics

edition : 19

hours : 146

level 1

course code	course name	prerequisite	prerequisite course
404101-4	Differential & Integral Calculus I		
403101-4	General Physics I		
601101-2	Islamic Culture I		
705101-2	English Language I		
605101-2	The Holy Qur'aan I		
402101-4	General Chemistry		

level 2

course code	course name	prerequisite	prerequisite course
404102-4	Differential & Integral Calculus II	404101-4	Differential & Integral Calculus I
403102-4	General Physics II	403101-4	General Physics I
		404101-4	Differential & Integral Calculus I
403121-4	Electricity and Magnetism	403101-4	General Physics I
		404101-4	Differential & Integral Calculus I
401102-2	Biology I: Zoology		
401101-2	Biology I: Plants		
404140-4	Elementary Algebra	404101-4	Differential & Integral Calculus I

level 3

course code	course name	prerequisite	prerequisite course
403240-3	Mathematical Methods in Physics I	404102-4	Differential & Integral Calculus II
403231-4	Optics	403102-4	General Physics II
		404102-4	Differential & Integral Calculus II
403285-3	Measuring Instruments	403121-4	Electricity and Magnetism
401211-4	Cell Biology		
403241-4	Classical Mechanics I	403102-4	General Physics II
		404102-4	Differential & Integral Calculus II
403212-3	Heat & Thermodynamics	403102-4	General Physics II
		404102-4	Differential & Integral Calculus II
501101-2	Arabic Language		

level 4

course code	course name	prerequisite	prerequisite course
403253-4	Atomic Physics	403231-4	Optics
		403240-3	Mathematical Methods in Physics I
403242-3	Mathematical Methods in Physics II	403240-3	Mathematical Methods in Physics I
601201-2	Islamic Culture II	601101-2	Islamic Culture I
705102-3	Communication Skills in English I	705101-2	English Language I
403296-2	Electrical Properties of Biological Solutions	403285-3	Measuring Instruments
403298-3	Membrane & Macromolecular Physics		
403204-2	Ultrasound in Medicine	403101-4	General Physics I
		404101-4	Differential & Integral Calculus I
102101-2	The Biography of Prophet Muhammad (pbuh)		

level 5

course code	course name	prerequisite	prerequisite course
605201-2	The Holy Qur'aan II	605101-2	The Holy Qur'aan I
403344-4	Quantum Mechanics I	403242-3	Mathematical Methods in Physics II
		403253-4	Atomic Physics
601301-3	Islamic Culture III	601201-2	Islamic Culture II
403371-3	Solid State Physics I	403253-4	Atomic Physics
403391-3	Medical Physics	401211-4	Cell Biology
403333-3	Laser in Medicine	403231-4	Optics
401360-3	Animal Physiology		

level 6

course code	course name	prerequisite	prerequisite course
403364-4	Medical Radiation Physics	403253-4	Atomic Physics
403383-2	Computer	403242-3	Mathematical Methods in Physics II
605301-2	The Holy Qur'aan III	605201-2	The Holy Qur'aan II
403393-3	Biomechanics	403241-4	Classical Mechanics I
403361-4	Nuclear Physics	403253-4	Atomic Physics
		403344-4	Quantum Mechanics I
705103-3	Communication Skills in English II	705102-3	Communication Skills in English I
601401-2	Islamic Culture IV	601301-3	Islamic Culture III

level 7

course code	course name	prerequisite	prerequisite course
403494-3	Radioisotopes in Medicine	403364-4	Medical Radiation Physics
403490-4	Clinical Physics	403364-4	Medical Radiation Physics
403483-1	Computers in Medicine	403383-2	Computer
605401-2	The Holy Qur'aan IV	605301-2	The Holy Qur'aan III
403423-4	Electronics	403371-3	Solid State Physics I
403497-3	Medical Imaging	403364-4	Medical Radiation Physics

level 8

course code	course name	prerequisite	prerequisite course
403499-6	Practical Training		

Level One

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

Course Specification

General Physics (1) 403101

Course Specification

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

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

A Course Identification and General Information
1. Course title and code: Physics 101 (PH 403101)
2. Credit hours: 4 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: 1^{th} Level-1^{th} year
6. Pre-requisites for this course (if any):
7. Co-requisites for this course (if any):
8. Location if not on main campus: University Campus

B Objectives

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

Physics 101 is an introductory physics course for non-science majors. This course focuses on basic physics concepts and connections to everyday life. Course topics include Newtonian mechanics, properties of matter, fluids, heat, light and sound,. Connections to everyday life and society include energy conservation, global warming, the origin of the universe, pseudoscience, and the search for extraterrestrial life. While advanced mathematics is not required for this course, basic math with some trigonometry and simple algebra is utilized. Proportional reasoning, estimating, and graphing skills are emphasized throughout the course. Overall goals of this course include students' gaining an appreciation for the physical world, improved critical thinking and reasoning skills, and improved scientific literacy for a better-informed public that can make intelligent voting decisions. Concurrent enrolment in a Physics 101 lab is required since the lab grade is included in the 4-credit hour course grade.

The main learning outcomes are as follows:

Measurement:

The physical quantities, units and standards of units: the international system of unit, standard of time, standard of mass, standard of length and dimensional analysis

Vectors:

vector and scalar quantities, components of vectors, adding vectors, multiplying vectors, scalar product and vector product

Properties of Matter:

Elasticity and fluid mechanics:

Fluid statics:

Pressure and density, fluid at rest, variation of pressure with the height in static fluid

Pascal's principle, Archimedes principle, pressure measurements and surface tension

Fluid Dynamics

Bernoulli's equation, streamlines and continuity equation, Bernoulli's equation

application of Bernoulli's equation, continuity equation and viscosity

Heat:

Temperature, macro-and microscopic description, thermal equilibrium, measurements of temperature, the ideal gas temperature scale and thermal expansion, heat as a form of energy, quantity of heat and specific heat, thermal conductivity, the mechanical equivalent of heat, heat and work

Optics:

Visible light, speed of light, geometrical and wave optics, reflection and refraction, deriving the law of reflection, total internal reflection, spherical marries, spherical reflection surface, thin lenses, optical instruments

1. The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)
2. To 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.
3. The day life applications in the domain of these electromagnetic phenomena
4. To analyse electric systems using a required basics
5. To understanding behaviour of components with direct and with alternating current.
6. The overall goal is to use the scientific method to come to understand the enormous variety of electromagnetic phenomena in terms of a few relatively simple laws

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. Explain strategy of the course in the beginning of the semester 2. Outlines of the physical laws, principles and the associated proofs. 3. Highlighting the day life applications whenever exist. 4. Encourage the students to see more details in the international web sites and reference books in the library. 5. Discussing some selected problems in each chapter. 6. Cooperate with different institution to find how they deal with the subject 7. Renew the course references frequently 8. 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)

Topics to be Covered	No of weeks	Contact Hours
Topics		
Measurement 1. The physical quantities 2. Units and standards of units 3. The international system of unit 4. Standard of time 5. Standard of mass 6. Standard of length 7. Dimensional analysis	2 weeks	6 hrs
Vectors 1. Vector and scalar quantities 2. Components of vectors 3. Adding vectors 4. Multiplying vectors 5. Scalar product 6. Vector product	2 weeks	6hrs
Properties of Matter Elasticity and fluid mechanics	1 weeks	3hr
Fluid statics 1. Pressure and density 2. Fluid at rest 3. Variation of pressure with the height in static fluid 4. Pascal's principle 5. Archimedes principle 6. Pressure measurements	2 weeks	6

7. Surface tension		
Fluid Dynamics 1. Bernoulli's equation 2. Streamlines and continuity equation 3. Bernoulli's equation 4. Application of Bernoulli's equation 5. Continuity equation and viscosity	2 weeks	6
Heat *1.* Temperature *2.* Macro-and microscopic description *3.* Thermal equilibrium *4.* Measurements of temperature *5.* The ideal gas temperature scale *6.* Thermal expansion *7.* Heat as a form of energy *8.* Quantity of heat and specific heat *9.* Thermal conductivity *10.* The mechanical equivalent of heat ***11.*** Heat and work	3 weeks	
Optics *1.* Visible light, *2.* Speed of light, , *3.* Geometrical and wave optics, *4.* Reflection and refraction, *5.* Deriving the law of reflection, *6.* Total internal reflection, *7.* Spherical marries, *8.* Spherical reflection surface, *9.* Thin lenses, *10.* Optical instruments	3 weeks	

2 Course components (total contact hours per semester):

Lecture: 45 hrs	Tutorial: 30 hr	Practical/Fieldwork /Internship:	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:

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.

a. Knowledge

1. Knowledge that students should know and understand when they complete the course is as follow:
2. Learning fundamentals in physics theory
3. Understanding the physics low 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 work.

(i) 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 problem
11. Keep the question "why" or "how" to explain always there
12. Build a strategy to solve problem

(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.
5. Ask quality question.

b. Cognitive Skills

(i) 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. Ability to explain the idea with the student own words.
5. Represent the problems mathematically.

(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
7. 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 analyze 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. iii. 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.

4. 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. 12. 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
(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	Midterm 1	5^{th} week	10
2	Midterm 2	10^{th} week	10
3	In-Class Problem Solving	13^{th},7^{th} week	10
4	Homework	Every week	10
5	Experimental	End of semester	20
6	Final exam	End of semester	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) 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] Physics by : Halliday, D and Resnick, Krane
[2] Physics for student of science and Engineering by A.L.Stanford and J.M. Tanner [3] Physics, by J. Walker, fourth Ed. [4] Fundamentals of Physics, by Halliday, Resnick and Walker
4-.Electronic Materials, Web Sites etc 1. http://www.physicsclassroom.com 2. http://www.eskimo.com

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

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.) 1. Lecture room for 30 students 2. Library 3. Laboratory for Physics (there is a special course for laboratory related to general physics)
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. Midterm and final exam. 2. Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (a) Course report (b) Program report

(c) Program self study ▪ 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) 1. The instructors of the course are checking together and put a unique process of evaluation *2.* Check marking of a sample of papers by others in the department. ***3.*** Feedback evaluation of teaching from independent organization.
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 Two

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

Course Specification
General Physics (2) 403102

Course Specification

Institution : Umm Al-Qura University
College/Department : Physics

A Course Identification and General Information

1. Course title and code: General Physics 403102-4
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) :To engineering students
4. Name of faculty member responsible for the course : Dr. LOULOU Mehrez
5. Level/year at which this course is offered: 2nd level
6. Pre-requisites for this course (if any): 101 Phys
7. Co-requisites for this course (if any):102 math
8. Location if not on main campus :on 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	Contac thours
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			
Assess ment	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	16th	15%
4	Mid-term exam	8th	30%
5	Final exam	17th	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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification
Electricity and Magnetism 403121

Course Specification

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

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

A Course Identification and General Information

1. Course title and code: Electricity and Magnetism (PH 121)
2. Credit hours: - 4 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: First year
6. Pre-requisites for this course (if any) PH 101 + MATH 101
7. Co-requisites for this course (if any) PH 285
8. Location if not on main campus :- Within The University Campus

B Objectives

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

The objective of this course is to establish the meaning of the ends of the computational and use in communication, and differentiation, integration and applications of it.

The objectives of this course are to tease out the laws of Electricity and Magnetism from our everyday experience by specific examples of how electric and magnetic phenomena manifest themselves.

We want to be able:

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

1. To understand basic Fundamentals of electricity and magnetism phenomena: Physics of electrostatic Field, electrostatic Energy, and magnetic field.
2. The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)
3. To describe, in words, the ways in which various concepts in electricity and magnetism come into play in particular situations; to represent these phenomena and fields mathematically in those situations; and to predict outcomes in other similar situations.
4. The day life applications in the domain of these electric and magnetic phenomena
5. To analyse electric systems using a required basics
6. To understanding behaviour of components with direct current.

The overall goal is to use the scientific method to come to understand the enormous variety of electric and magnetic phenomena in terms of a few relatively simple laws

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- Explain strategy of the course in the beginning of the semester
2- Outlines of the physical laws, principles and the associated proofs.
3- Highlighting the day life applications whenever exist.
4- Encourage the students to see more details in the international web sites and reference books in the library.
5- Discussing some selected problems in each chapter.
6- Cooperate with different institution to find how they deal with the subject
7- Renew the course references frequently

8-	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 :-		
Topics	No of Weeks	Contact hours
1- Electric charge and Coulomb's law		
1- Introduction	1	0.5
2- Electric Charge		0.5
3- Conductors and Insulators		0.5
4- Coulomb's law		0.5
5- Charge is Quantized		0.5
6- Charge is Conserved		0.5
2- The Electric Field		
1- Fields	1	0.5
2- The Electric Field E		0.5
3- The Electric Field of a Point Charges and Lines of Force		0.5
4- The Electric Field of Continuous Charge Distributions		0.5
5- A Point Charge in an Electric Field		0.5
6- A Dipole in an Electric Field		0.5
3- Gauss Law		
1- The flux of a Vector Field	1	0.5
2- The Flux of the Electric Field		0.5

3- Gauss law		0.5
4- A Charged Insolated Conductor		0.5
5- Applications of Gauss law		0.5
6- Experimental Tests of Gauss law and Coulomb law		0.5
4- Electric Potential		
1- Electrostatic and Gravitational Forces	1.5	0.5
2- Electrical Potential Energy		0.5
3- Electric Potential		0.5
4- Calculating the Potential from the Field		0.5
5- Potential due to Point Charge		0.5
6- Potential due to a Collection of Point Charges		0.5
7- The Electric Potential of Continuous Charge distribution		0.5
8- Equipotential Surfaces		0.5
9- Calculating the Field from the Potential		0.5
10- An Insulated Conductor		0.5
5- Capacitors		
1- Capacitance	1.5	0.5
2- Calculating the Capacitance		1.0
3- Capacitors in Series and Parallel		0.5
4- Energy Storage in an Electric Field		0.5
5- Capacitor with Dielectric		1.0
6- Dielectrics: an Atomic View		0.5
7- Dielectrics and Gauss law		0.5

6- Current and Resistance		
1- Electric Current	1	0.5
2- Current Denstiy		0.5
3- Resistance, Resistivity, and Conductivity		0.5
4- Ohm’s law		0.5
5- Ohm’s law: A Microscopic View		0.5
6- Energy Transfers in an Electric Circuit		0.5
7- DC Circuits		
1- Electromotive Force	1	0.5
2- Calculating the Current in a Single Loop		0.5
3- Potential Differences		0.5
4- Resistors in Series and Parallel		0.5
5- Multiloop Circuits		0.5
6- RC Circuits		0.5
8- The Magnetic Field		
1- The Magnetic Field B	2	0.5
2- The Magnetic Force on a Moving Charge		1
3- Circulating Charges		1
4- The Hall Effect		1
5- The Magnetic Force on a Current		1
6- Torque on a Current Loop		0.5
7- The Magnetic Dipole		1

9- Ampere's Law		
1- The Biot-Savart Law	2	1
2- Applications of the Biot-Savart Law		1
3- Lines of Magnetic Field		1
4- Two Parallel Conductors		1
5- Ampere's Law		1
6- Solenoids and Toroids.		1

2 Course components (total contact hours per semester):			
Lecture: 42 hr	Tutorial: 30 hr	Practical/Fieldwork /Internship:	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

(i) knowledge that students should know and understand when they complete the course are as follow:

- Learning fundamentals in electricity and magnetism theory.
- Understanding the physics of electricity and magnetism and their applications mentioned in the text.
- Improving logical thinking.
- To use mathematical formulation to describe the physical principle or phenomena
- Ability to explain how things work.

(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 problem;
11. Keep the question "why" or "how" to explain always there;
12. Build a strategy to solve problem.

b. Cognitive Skills

(i) 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. Ability to explain the idea with the student own words.
5. Represent the problems mathematically.

(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 7. 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 analyze some phenomena
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 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. • Encourage the student to attend lectures regularly by: ▪ Giving bonus marks for attendance ▪ Assigning marks for attendance. ▪ 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. 4. Feeling mathematical reality of solving problems.
(ii) Teaching strategies to be used to develop these skills 1. Know the basic physical 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. Lectures for problem solution. 10. Encourage the student to ask good question to help solve the problem. 11. 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
(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	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) 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] Fundamental of Physics, 8th Edition, by: Jearl Walker. (2008)
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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 - 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 - Midterm and final exam. - Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (a) Course report (b) Program report (c) Program self study - 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department.

- Feedback evaluation of teaching from independent organization.

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 Mathematics and basic science.

Level Three

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Mathematical Methods (I) 403240

Course Specification

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

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

A Course Identification and General Information

1. Course title and code: Mathematical Methods (I) (Phys. 240)
2. Credit hours: - 3 Credit Hours
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course: Dr. Mufeed Al-Maghrabi
5. Level/year at which this course is offered: Second year
6. Pre-requisites for this course (if any): Pre-Requisite: Math. 102
7. Co-requisites for this course (if any): Non
8. Location if not on main campus :- Within The University Campus

B Objectives

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

1. Giving the students the opportunity to master many of the mathematical techniques necessary for follow-up courses in mathematics, physics and chemistry.
2. Training the students how to think about the physical phenomena in mathematical terms.
3. Develop an intuitive feeling for the precise mathematical formulation of physical problems and for the physical interpretation of the mathematical solutions.
4. Be familiar with the mathematical formulae of this course that frequently appear in physics problems.
5. Demonstrate the applications of mathematical methods to a variety of problems in physics.
6. Apply the concepts of partial differentiation, infinite series, conic sections, Fourier series and ordinary differential equations to real problems in physics.
7. Develop the learning skills of the students in using computers as an educational tool, problem solving and demonstration.
8. Enhance the students' analytical, reasoning, and self-learning skills.
9. Be familiar with the methods of solving ordinary differential equations.
10. Be able to deal with real problems using analytical methods.

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. Implementing different teaching methods.
2. Encourage the students to use different learning resources including the use of the World Wide Web (WWW) search engines.
3. Make use of programs that already available like mathematica for numerical solutions and as a double check for the final answers of the analytical problems.

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
Topics		
I) PARTIAL DIFFERENTIATION	3 weeks	9 hours
1. Total differential		
2. Chain rule for differentiating function of a function		
3. Implicit differentiation		
4. Application of partial differentiation to maximum and minimum problems		
5. Lagrange multipliers		
6. Change of variables		
7. Extra problem solving sessions		
II) INFINIT SERIES, POWER SERIES	2 weeks	6 hours
1. The geometric series with applications		

2. Convergent and divergent series		
3. Testing series for convergence		
4. Power series; interval of convergence		
5. Expanding functions in power series		
6. Some uses of series		
7. Extra problem solving sessions		
III) CONIC SECTIONS	3 weeks	9 hours
1. The general quadratic equation		
2. Equation for a circle, ellipse, parabola and hyperbola		
3. Parametric equation for a circle, ellipse, parabola and hyperbola		
4. Polar equation for a circle, ellipse, parabola and hyperbola		
5. Extra problem solving sessions		
IV) FOURIER SERIES	3 weeks	
1. Simple harmonic motion; periodic functions		9 hours
2. Applications of Fourier series		
3. Average value of a function		
4. Fourier coefficients		
5. Complex form of Fourier series		
6. Even and odd functions		
7. Parseval's theorem		
8. Extra solving problems sessions		
V) ORDINARY DIFFERENTIAL EQUATIONS		

1. Separable equations	3 weeks	9 hours
2. Linear first-order equations		
3. Other methods for first-order equations		
4. Second-order linear equations with constant coefficients and zero right hand side		
5. Extra solving problems sessions		

2 Course components (total contact hours per semester):			
Lecture: 42 hrs	Tutorial: zero hrs	Practical/Fieldwork /Internship:	Other: Office hours : 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) This actually depends on the student's level, study skills and habits, but in general three hours per week are sufficient.

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 when they complete the course is as follows:

1. Be familiar with the notations of each subject in the course.
2. Show ability to perform partial differentiation for a function of several variables or for a function of a function.
3. Be able to expand functions in power series or in Fourier series.
4. Show ability to decide whether a given series is convergent or divergent.
5. Be familiar with the definitions of even and odd functions and their properties.
6. Be able to recognize the type of a given differential equation and to choose the suitable method for solving it.
7. Be able to deduce the equations for a circle, ellipse, parabola and hyperbola from the general quadratic equation.
8. Be able to write the equations of conic sections in parametric and polar forms.

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

1. Lecturing.
2. Solving examples during the lecture time.
3. Using different teaching methods.
4. Build a problem solving strategy.
5. Strengthening basic proof techniques.
6. Improve ability to integrate information and ideas.
7. Open discussions.

(iii) Methods of assessment of knowledge acquired

1. Homework assignments.
2. Quizzes.
3. Term paper.
4. Exams.

b. Cognitive Skills

(i) Cognitive skills to be developed

1. Develop analytic skills.
2. Develop problem-solving skills.
3. Develop ability to think creatively.
4. Improve memory skills.
5. Improve mathematical skills.

(ii) Teaching strategies to be used to develop these cognitive skills 1. Develop ability to synthesize and integrate information. 2. Encourage the students to use different learning resources. 3. Writing the final answer in concise form when possible. 4. Writing an equation/physical law in wards. 5. Using shortest way to reach the final answer. 6. Using appropriate symbols that can be easily memorized.
(iii) Methods of assessment of students cognitive skills 1. Oral questions. 2. Presentations. 3. Term paper. 4. Quizzes. 5. Problem solving.
c. Interpersonal Skills and Responsibility
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed 1. Develop ability to work independently. 2. Develop ability to work productively with others. 3. Improve self-esteem. 4. Develop leadership skills.
(iii) Teaching strategies to be used to develop these skills and abilities 1. Homework assignment for each group of the students. 2. Homework assignments that should be worked out independently. 3. Cooperative learning. 4. Microteaching.
(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility 1. Marking the home works. 2. Asking the members of each group about the content of their assignment. 3. Working closely with the different groups.
d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain. 1. Perform effective communication with colleagues and faculty members. 2. Ability to use programs designed for numerical computation. 3. Problem solving and ability to interpret the results. 4. Ability to use the World Wide Web (WWW) search engines.
(ii) Teaching strategies to be used to develop these skills *1.* Problem based learning. 2. Additional lectures on numerical techniques. 3. Exposing the students to problems that can only be solved numerically.
(iii) Methods of assessment of students numerical and communication skills *1.* Give the students homework assignments on problems that can be solved numerically. *2.* Ask the students to search the internet for the solution of a specific problem. 3. Using the computer to construct three dimensional graphs.
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

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	First Exam	6^{th} week	20
2	Second Exam	11^{th} week	20
3	In-Class Problem Solving	At the end of each chapter	10
4	Home works and quizzes	Every week	10
5	Final exam	Allocated by	40

		registration	

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) Five office hours per week. If some students are busy during these times, they can arrange with me (lecturer) for other times.

E Learning Resources

1. Required Text(s): Mathematical methods in the physical sciences. Third edition, by Mary L. Boas
2. Essential References: Mathematical Methods for Physicists by G. Arfken
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) 1. Mathematical Methods by M.C. Potter and J. Goldberg. 2. Mathematical Physics by E. Butkov 3. Introduction to Mathematical Physics by N. Laham.
4-.Electronic Materials, Web Sites etc 1. www.mpipks-dresden.mpg.de/~jochen/methoden/outline.html 2. People.uncw.edu/hermanr/phy311/mathphysbook/index.html
5- Other learning material such as computer-based programs/CD, professional standards/regulations. The following programs are essential for numerical computing and graphing. 1. Mathematica 2. Matlab. 3. Origin.

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. • Data show.
2. Computing resources 1. Computer room for 20 students equipped with computers and access to the internet. 2. Software for numerical computing.
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 Confidential instructor evaluation questionnaire by the end of the course.
1 Other Strategies for Evaluation of Teaching by the Instructor or by the Department 1. Course report. 2. Observations and assistance from colleagues.
3 Processes for Improvement of Teaching 1. Review the student's feedback and work on the weak points. 2. Use combination of different teaching methods.

4	Processes for Verifying Standards of Student Achievement 1. Check marking by another teaching staff of a sample of student work. 2. Peer reviewing of tests remarking and sample of student assignments.
5	Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. 1. Regular evaluation of students' feedback. 2. Review the course outline and teaching methods. 3. Submit a course report to the curriculum committee in the department to discuss the content of the course and its connection with other courses. 4. Annual improvement and updating the course based on the outcomes of the reviewing process.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Optics 403231

Course Specification

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

Institution	Umm AL-Qura University
College/Department	College of Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Optics PH -231
2. Credit hours: 4 cr. Hr (3 contact hrs + Lab)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course **Dr. Afaf Maweed Abdelmageed**
5. Level/year at which this course is offered Second year
6. Pre-requisites for this course (if any) PH 101, Math 101
7. Co-requisites for this course (if any)
8. Location if not on main campus Within The University Campus

B Objectives

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

The physical optics science considered one of the most important fields in experimental and theoretical physics.

The objectives of this course are to through light on nature of light. And also throw light on different phenomena like interference, diffraction, polarization and their application in life.

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

1. To understand basic Fundamentals of physical optics and its relation with basic science and modern technology.
2. The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)
3. To describe, in words, the ways in which various concepts in optics come into play in particular situations; to represent these optical phenomena and its fields mathematically in those situations; and also to predict outcomes in other similar situations.
4. The day life applications in the domain of this course.
5. To analyze optical systems using a required basics

The main goal of this course is to use the scientific methods to understand the individual points of the course and its relation with the applied technology surrounding him.

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. Explain strategy of the course in the beginning of the semester
2. Outlines of the physical laws, principles and the associated proofs.
3. Highlighting the day life applications whenever exist.
4. Encourage the students to see more details in the international web sites and reference books in the library.

5- Encourage the student to build an example of different experiments related to course and comparing it with experiments in the lab.

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	Contac thours
Interference - Addition of two waves of the same frequency - Vector addition of amplitudes - Addition of simple harmonic motion at right angles - Interference of two beam - Huygens principle - Young experiment - Fresnel Biprism - Leoyd mirror - Michelson interferometer - Interference involving multiple reflections - Reflection from a plane parallel film - Newtons rings - Fabry perot interferometer - Chromatic resolving power		**5 Weeks**
Fraunhofer diffraction - Fraunhofer diffraction by a single slit - Diffraction by a single slit and further investigation of the diffraction pattern - Graphical treatment of amplitudes- the vibration curve - Rectangle and circular aperature - The double slit - Comparison of the single and double slit pattern - Distinction between interference and diffraction - Positions of the minima and maxima		**3 weeks**
Diffraction grating - Effect of increasing the number of slits - Intensity distribution from an ideal grating - Principle maxima - Minima and secondary maxima - Formation of spectral by grating - Dispersion - Overlapping of orders - Width of the principle maxima - Resolving power of a grating		**3 weeks**

Fresnel diffraction - Diffraction by a circular - Diffraction by a obstacle - Fresnel integral - Cornu`s spiral - Single slit - Straight edge		**2** **weeks**
Polarization - Different methods to separate polarised from un polarised - Mathematical equations representing plane, circular, and elliptical polarization - Optical active phenomena - Half and quarter wave layers		**2** **weeks**

2 Course components (total contact hours per semester):			
Lecture: **45 hr**	Tutorial: **30 hr**	**<u>Practical</u>**/Fieldwork/Internship: **30 hr**	Other: Office hours : **36 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;s • 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 *(i)* Description of the knowledge to be acquired (ii) Learning basic fundamentals in physical optics. (iii) Understanding the physics of wave motion, superposition of waves, interference, diffraction, and polarization (iv) Improving logical thinking. (v) To use high mathematical formulation to describe the physical principle of different physical phenomena
(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 problem; 11. Keep the question "why" or "how" to explain always there
(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 and asking about quality question.
b. Cognitive Skills

(i) 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. Analyze and explain natural phenomena. 4. Ability to explain the idea with the student own words. 5. Represent the problems mathematically.
(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 **7.** Doing 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
c. Interpersonal Skills and Responsibility
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed 1. The student work independently. 2. The students learn independently and take up responsibility. 3. Self learning
(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: • Giving bonus marks for attendance

- Assigning marks for attendance.

(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.

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

(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

(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.

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			
Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm exam 1	5th week	10
2	Midterm 2	10th week	10
3	Homework	Every week	5
4	Project	12th week	5
5	Solving problems	Every week	10
6	Experimental exam	End of semester	20
7	Final exam	End of semester	40

8			

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) 6 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- Fundamentals of optics , by Jenkins \ white 2- Introduction to Classical and Modern Optics By: Jurgen R. Meyer-Arendt.
4-.Electronic Materials, Web Sites etc http://www.physicsclassroom.com http://www.learnerstv.com/
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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 □Laboratory for optics
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 1. Midterm and final exam. 2. Quiz
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching ▪ Course report ▪ Program report ▪ Program self study ▪ 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) 1- The instructors of the course are checking together and put a unique process of evaluation.

2- Check marking of a sample of papers by others in the department. 3- Feedback evaluation of teaching from independent organization
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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Measuring Instruments 403285

Course Specification

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

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

A Course Identification and General Information

1. Course title and code: Measuring Instruments PH285
2. Credit hours 3Cr. (2 + Lab)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course
5. Level/year at which this course is offered Third level
6. Pre-requisites for this course (if any) Electromagnetism 121
7. Co-requisites for this course (if any)
8. Location if not on main campus Within The University Campus

B Objectives

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

By the end of this course the student should be able to:

1. Understand the concept of an instrumentation system: to support accurate measurements
2. Understand the concepts sensitivity, accuracy and precision
3. Understand the theory and operation of various instruments
4. Use different instruments
5. Build, calibrate and use an instrument.
6. Measure current, voltage, resistance, frequency, capacitance and inductance
7. Discuss the construction and operation of the oscilloscope
8. Analyse data obtained and design an instrumentation system
9. Select and apply Ac/DC voltage suitable for different circuits
10. Understand on a theoretical level R-C circuit, R-C-L circuits energy storage in magnetic field and different oscillations.

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. Explain strategy of the course in the beginning of the semester
2. Outlines of the physical laws, principles and the associated proofs.
3. Highlighting the day life applications whenever exist.
4. Encourage the students to see more details in the international web sites and reference books in the library.
5. Discussing some selected problems in each chapter.
6. Cooperate with different institution to find how they deal with the subject
7. Renew the course references frequently
8. 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

Topic	No of Weeks	Contac thours
Measurement: Calibration, Need for mesurements , Classification of Measuring Instruments, Accuracy, Precision, Sensitivity, Response, Bandwidth, Resolution, Measurements Errors, Gross Errors, Systematic Error, and Random Errors.	2	6
Direct Current Instruments: Moving Coil Galvanometer, Suspendion, Construction and Idea of the Theory of the Galvanometer , Sensitivity of the Galvanometer.	1	3
Ammeters, Voltameter and Ohmmeter: Single Range Ammeter, Multirange Ammeter, Single Range Voltameter, Multirange Voltameter, Voltameter Sensitivity, Loading Effect, Ammeter Voltameter Method for Measuring Resistance, Seroes Type Ohmmeter, Shunt Type Ohmmeter, and Multimeter and Calibration.	2	6
Potentiometer: Basic Circuit of a Simple Potentiometer, Single Range Direct Reading Potentiometer, and Dual Range Potentiometer	1	3
Oscilloscope: Cathode Ray Tube, Electron Gun, Electrostatic Focusing and Snell's Law, Electrostatic deflection , Horizontal and Vertical Deflection and deflecting Plates, and Florescent Screen.	2	6

Faraday's Law of Inductance:, Faraday's Experiments, Faradays Law of Inductance, Lenz's law, Motional E.M.F., Induced Electric Field.	2	6
Inductance: Inductance, Calculating the Inductance, R-C Circuits, Energy Storage in a Magnetic Field, Electromagnetic Oscillations, Qualitative Damped and Forced Oscillations.	2	6
Alternating Current: Electeric Generator and the Sinusoidal Representation of the Alternating Current (AC), R-LC Circuits, Reactance, Impedance, Resonance in R-LC Circuits, Power in AC Circuits, Power Factor, Root-Mean- Square (RMS) Values of Current and Voltage, Using of the Complex Quantities in the AC Circuits, and AC Bridges.	2	6

2 Course components (total contact hours per semester):			
Lecture: 42 hrs	Tutorial:	Practical/Fieldwork/Internship: 42 hrs	Other: Office hours : 32 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)

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. Developing important concepts of measurements such as accuracy, precision, sensitivity, response, resolution, and errors.
2. Understanding the operation of different instruments such as ammeter, voltammeter, Ohmmeter and Oscilloscope.
3. Using of the complex quantities to analyse equations of R-C and R-C-L circuits and calculating the impedance, power factor, root-mean- square values of current and voltage.
4. To use mathematical formulation to describe the physical principle or phenomena.
5. Improving logical thinking.

(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 problem;
11. Keep the question "why" or "how" to explain always there;
12. Build a strategy to solve problem.

(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.
5. Ask quality question.

b. Cognitive Skills

(i) 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. Ability to explain the idea with the student own words.
5. Represent the problems mathematically

(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
7. 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 analyze some phenomena.
c. Interpersonal Skills and Responsibility
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed The students should learn independently and take up responsibility through: 1. Write a report 2. Develop his English language 3. Think in solving problems 4. Search on the internet 5. Collect the material of the course 6. Deal with the lost lectures that he missed. 7. The students should know how to do that independently and through discussions with the others
(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 his interest in Science through :(lab work, field trips, visits to scientific and research institutes). 6- Encourage the student to attend lectures regularly by giving bonus marks for attendance 7- Give students tasks of duties 8- Learn how to write reports some of them in English language.
(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. Communication with others: the lecturer – students in the class
2. IT through: the Internet – computer skills
3. Numerical skills through: solving problems- computation – data analysis – 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
12. 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

not applicable

(ii) Teaching strategies to be used to develop these skills not applicable
(iii) Methods of assessment of students psychomotor skills not applicable

5. Schedule of Assessment Tasks for Students During the Semester

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Exam I	6	15%
2	Exam II	12	15%
3	Class activities(presence – reports – participation)	weekly	10%
4	Final exam	16	40%
5	Practical Exam	15	20%

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 4 hours per week

E Learning Resources

1. Required Text(s)
2. Essential References
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) Fundamental of Physics by Halliday & Resnick
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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.) 1. Lecture room for 30 students 2. Library 3. Laboratory
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. Midterm and final exam. 2. Quiz.

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching - Course report - Program report - Program self study - 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) 1. The instructors of the course are checking together and put a unique process of evaluation 2. Check marking of a sample of papers by others in the department. 3. Feedback evaluation of teaching from independent organization.
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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation and Assessment

Course Specification

Classical Mechanics (1) 403241

Course Specification

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

Institution:	Umm AL-Qura University
College/Department:	Faculty of Science / Physics Department

A Course Identification and General Information

1. Course title and code: **Classical Mechanics (1) (PH 241)**
2. Credit hours 4 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course Dr. Doaa Abd Allah Said
5. Level/year at which this course is offered 3^{th} Level – 2^{th} Year
6. Pre-requisites for this course (if any) Pre-Requisite 102 PH + 102 Math
7. Co-requisites for this course (if any) 101 PH+101 Math
8. Location if not on main campus The University 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 (I) through 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, Gauss's and Stokes's Theorem.
3. The analyse coordinate systems (curvilinear, differential vector operator, Cartesian, spherical and cylindrical) in physics
4. General motion of the particles in the three dimension
5. Knowledge and discussed the noninternal reference systems
6. The central forces and celestial mechanics.
7. Special relativity

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 in 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 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 web sites and reference books in the library, discussing some selected problems in each chapter, 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)

1 Topics to be Covered

Topics	No of Weeks	Contact hours
Vector Analysis		
1-Definition		

2-Scalar Product	2weeks	8hrs
3- Vector or Cross product		
4- Triple Scalar Product, Triple Vector Product		
5-Gradient		
6- Divergence		
7-Curl X		
8- Successive Application of operator		
9-Vector Integration		
10-Gauss's Theorem		
11- Stokes's Theorem		
Coordinate Systems	1week	4 hrs
1- Curvilinear Coordinates		
2- Differential Vector Operations		
3- Cartesian Coordinates		
4- Spherical Polar Coordinates		
5- Circular Cylindrical Coordinates		
General Motion of A Particle in Three Dimensions		
1- Linear Momentum		
2- Angular Momentum		
3- The Work Principle	3weeks	12hrs
4- Conservative Forces and Force Fields		
5- The Potential Energy Function in 3-Dim. Motion		
6- Condition For The Existence of a Potential Function		
7- Motion of a projectile in a Uniform Gravitational Field		
8- The Harmonic Oscillator in Two And Three dimensions		

9- Constrained Motion of a Particle		
10- The Simple Pendulum		
11- More Accurate Solution of The Simple Pendulum		
12- Examples		
Non-inertial Reference Systems		
1-Translation of the Coordinate System		
2- Inertial Force		
3-General Motion of The Coordinate System		
4- Dynamics of a Particle in a Rotating Coordinate System(Coriolis Force)	3weeks	12 hrs
5-Effects of The Earth's		
6-The Foucault Pendulum		
7-Examples		
Central Forces and Celestial Mechanics		
1-The Law of Gravity		
2- Gravitational Force Between a sphere and a Particle		
3- Potential Energy in a Gravitational Energy		
4-Potential Energy in a General Central Field		
5-Angular Momentum in a Central Field		
6-The Law of Areas, Kepler's Laws Of Planetary Motion	3weeks	12 hrs
7-Orbit of a Particle in a Central Field		
8-Energy Equation of the Orbit		
9-Orbits in an Inverse-Square Field		
10-Periodic Time of Orbital Motion		
11-Motion in an Inverse-Square Repulsive Field		
12-Examples		

Special Relativity		
1-The Michelson-Morley Experiment		
2-The Special Theory of Relativity		
3-Time Dilation		
4-The Twin Paradox		
5-The Length Contraction		
6-Meson Decay	2weeks	8 hrs
7- The Lorentz Transformation		
8-The Inverse Lorentz Transformation		
9-Velocity Addition		
10-Relativity of Mass		
11-Mass and Energy		

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 5. Solve some example during the lecture. **6.** Exams**:** a) Quizzes b) Short exams (mid term exams) c) Long exams (final) d) Oral exams 7. Discussions with the students. 8. 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	10
2	Midterm 2	10th week	10
3	In-Class Problem Solving	13th,7th week	10
4	Project	12th week	10
5	Homework	Every week	10
6	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. S. T. Thornton and J. B. Marion, " Classical Daynamic of Particles and System", 4th Edition, Brooks Cole (2003) 2. Ernesto Corinaldesi, "Classical Mechanics for Physics Graduate Students", World Scientific Publishing, (1999) 3. T. W. Kibble and F. H. Berkshire, "Classical Mechanics" World Scientific Publishing, (2004) 4. M. W. McCall, " Classical Mechanics; from Newton to Einstein" 2th edition Wiley (2010)
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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Thermodynamcs 403383

Course Specification

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

Institution:- **Umm AL-Qura University**
College/Department :- **College of Sciences / Physics Department**

A Course Identification and General Information

1. Course title and code: thermodynamics**,** Phys 403383
2. Credit hours: - **3 Cr.**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Pure physics and Medical physics
4. Name of faculty member responsible for the course **Dr. / Ahmed El-hadi**
5. Level/year at which this course is offered Second year
6. Pre-requisites for this course (if any) 101 Phys. or 102 Phys**.**, modern physics, understanding of theoretical physics including knowledge of differential an integral calculus and differential equations.
7. Co-requisites for this course (if any) no-Co-requisite
8. Location if not on main campus :- within the university campus

B Objectives

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

   1. The course provides a general introduction in the thermodynamics include all basic definitions and problem types relating to the laws of thermodynamics.
   2. The definition of heat leads to the 1st law of thermodynamics and its consequences, such as thermodynamic work, heat and internal energy. Isothermal, adiabatic and free expansion processes are to be studied in detail.
   3. The second law of thermodynamics is introduced through heat engines, and expressed in terms of entropy changes, which are calculated for a variety of processes. Maxwell's relations, the Clausius-Clapeyron equation.

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. The students are training to search for some scientific subjects such as energy exchange processes (in terms of various forms of energy, heat and work) in aerospace systems. Understandable how various heat engines work. First Law of Thermodynamics to a system of thermodynamic components (heaters, coolers, pumps, turbines, pistons, etc.) to estimate required balances of heat, work and energy flow.
   2. Ideal cycle analysis to simple heat engine cycles to estimate thermal efficiency and work.
   3. Explain the physical content and implications of the second law in non-mathematical terms.
   4. Use entropy calculations as a tool for evaluating irreversibility.

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 :- The course consists of three parts

Topics	No of Weeks	Contact hours
1. **Thermal properties of matter:** Temperature and Heat, Temperature scales, Type of thermometer, Zero law of Thermodynamic, Thermal transfers, thermal expansion.	2W	6

2.	**Thermodynamics properties:** equation of ideal gas, kinetic theory, Van der Waal equation for real gas, Deducation of the critical constant of a real gas of Van der Waal, Virial equation of state, Reduced equation of state, adiabatic compressibility, P-V-T relationship of real gases, Phase Diagram.	2W	6
2	**First law of thermodynamics, Heat and Energy**: The types of systems and the processing in thermodynamics, the definition of heat capacity and specific heat capacity, latent heat, apply the first law of thermodynamics to evaluate the temperature and work and the internal energy and energy conversion, explain the enthalpy, the relationship between specific heat for gas, the work done in adiabatic process.	3W	9
3	**Second law of thermodynamics:** heat engines, refrigerators, and heat pumps, reversible processes, statements of Kelvin - Planck and Clausius. Carnot machine and its efficiency, and examine the principles of the Carnot cycle, and efficiency of Otto cycle and diesel fuel and gasoline,	2W	9
4	**Entropy and third law of thermodynamics:** explain the concept of entropy, the change in entropy in the reversible processes, explain the third law of thermodynamics.	2W	6
5	**Thermodynamics potentials:** thermodynamics potentials, internal energy U, enthalpy (H), free energy of Gibbs (G) and Helmholtz free energy (A), Maxwell relations and their the application, Tds equations, Clausiuos Claperyron equation.	2W	6

Text books and References:
1. Daniel V. Shroeder, An Introduction to Thermal Physics, Addison-Wesley Publishing Company, San Francisco, CA, 1999, The ISBN is 0-201-38027-7. 2. Blundell S.J / Blundell K.M., Concepts in Thermal Physics, Oxford University Press, ISBN 978-0-19-856770-7. 3. Kittel C. and Kroemer H. ,Thermal Physics, , 2nd Ed., Freeman and Co. (1994), ISBN 0-. 7167-1088-9. 4. Statistical and thermal physics: Fundamentals and applications, M.D. Sturge, , A K Peters Natick, Massachusetts (2003). 5. Sturge M.D., Statistical and Thermal Physics, Fundamentals and Applications (A.K. Peters, Natick, Massachusetts, 2003) ISBN 1-56881-196-9. 6. Callen H. B., Thermodynamics and an introduction to thermostatistics, 2nd Ed., John Wiley & Sons (1995). John Wiley & Sons, New York, 1985), ISBN 0-471-86256-8. 7. David Chandler, Introduction to Modern Statistical Mechanics (Oxford University Press, New York, 1987), ISBN 0-19-504277-8. 8. Walter Greiner, Ludwig Neise and Horst Stoecker, Thermodynamics and Statistical Mechanics, English edition, translated from the German by Dirk Rischke (Springer, New York, 2000), ISBN 0 387 94299 8. 9. D. Landau and E. M. Lifshitz, Statistical Physics, Part I, Landau and Lifshitz Course of Theoretical Physics, Volume 5 (Butterworth-Heinemann, Oxford, 1980) 3rd edition ISBN 0 7506 3372 7 , Part II, E.M. Lifshitz and L.P. Pitaevskii, ISBN 0 7506 2636 4.

2 Course components (total contact hours per semester):			
Lecture: 41 hr	Tutorial: 12	Practical/Fieldwork /Internship: 0	Other: Office hours : 12

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) 1 hr
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. Students have proficiency in describing and using the basic principles underlying the study of thermodynamics, include the ideal gas model, the pure substance model, and combustion processes.

2. Students can explain at a level understandable the concepts of path dependence/independence and reversibility/irreversibility of various thermodynamics processes, represent these in terms of changes of thermodynamic state, and cite examples of how these would impact the performance of simple energy generation systems.

3. Students have an understanding and appreciation for the implications of the science of thermodynamics on society as a whole (in scientific, historical and economic contexts) and recognize connections between thermodynamics and other areas of study.

4. Students can explain the First Law of Thermodynamics and define heat, work, thermal efficiency and the difference between various forms of energy.

5. Students can estimate the thermodynamic efficiency and power production of an arbitrary ideal cycle.

6. Students can use entropy calculations as a tool for evaluating losses and irreversibility in engineering processes.

7. Students can apply the basic principles and laws of thermodynamics to an availability analysis of an energy conversion system.

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

1. Theoretical teaching is supported by problem solving.
2. Give the students the summary of course after the end of each chapter.
3. Recommended textbooks , data show, internet.

(iii) Methods of assessment of knowledge acquired

The grade is based on performance in the exams, quizzes, homework, oral presentation, and final exam.

Midterm (2) 30%

Report + Quiz .... 10% Homework and Activities............................ 10% Final exam.. 50% The student will be graded according to two written midterm and one written final exams. **Homework** : it consist of reading, problems, mathematical derivations, calculations, and questions that require detailed explanations. **Presentations:** Each student will make a report of some of the topics to the thermal physics and worked an small oral presentation with power point text like modern conference will be at the end of the semester..
b. Cognitive Skills
(i) Cognitive skills to be developed Introducing the basic links between previous related subject (such as classical thermodynamics) and the new subject. Homework assignments Lecture discussions
(ii) Teaching strategies to be used to develop these cognitive skills Ask students to attend lectures for the exercise of solving some problem with household tasks
(iii) Methods of assessment of students cognitive skills *1.* Asking questions during lectures 2. Midterm exams and quizzes. 3. Doing homework. 4. Discussion in thermal physics , check the problems solution.
c. Interpersonal Skills and Responsibility
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed 1. The student must learn to rely on himself and to have the ability to hard work independently and with groups. 2. Develop his English language
(ii) Teaching strategies to be used to develop these skills and abilities

Encouragement of student for reading, go to the university library and compile information on the course
(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility The ability to search through the library and internet to give information on the course, and the ability to understand and the think of problems by solving the exercises and questions in solving problems.
d. Communication, Information Technology and Numerical Skills
(i) Description of the skills to be developed in this domain. The student should know how to use computer to solve statistical problem, search in the internet, improve his English language.
(ii) Teaching strategies to be used to develop these skills Encourage students to solve problems and homework on the blackboard
(iii) Methods of assessment of students numerical and communication skills Give students tasks to measure their calculations and analysis, problem solving. Encourage students to seek help if necessary. Encourage students to ask a good question to help solve the problem.
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required **Not applicable.**
(ii) Teaching strategies to be used to develop these skills **Not applicable.**
(iii) Methods of assessment of students psychomotor skills **Not applicable.**

5. Schedule of Assessment Tasks for Students During the Semester

Assess ment	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 + reports**	**During the semester**	**10%**
4	**Homeworks**	**During the semester**	**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)

1- 12-office hours per week in the lecturer schedule.

2- The contact with students by e-mail.

E Learning Resources

1. Required Text(s)

1. Kittel C. and Kroemer H. ,Thermal Physics, , 2nd Ed., Freeman and Co. (1994), ISBN 0-. 7167-1088-9.
2. W.Nolting, Grundkurs Theortische Physik, Statistische Physik.

3. Statistical and thermal physics: Fundamentals and applications, M.D. Sturge, , A K Peters Natick, Massachusetts (2003).
2. Essential References; 1. Daniel V. Shroeder, An Introduction to Thermal Physics, Addison-Wesley Publishing Company, San Francisco, CA, 1999, The ISBN is 0-201-38027-7.
3- Recommended Books and Reference As above
4-.Electronic Materials, Web Sites etc There are huge number of web sites that provide so much information and of great interest for thermodynamics.
5- Other learning material such as computer-based programs/CD, professional standards/regulations None

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 and a board to write.
2. Computing resources calculator
3. Other resources (specify --eg. 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 Instructor or by the Department The colleagues who teach the same course discuss together to evaluate their teaching.
3 Processes for Improvement of Teaching Course report, Program report and Program self-study and a tutorial lecture must be added to this course.
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) • The instructors of the course are checking together and put a unique process of evaluation. • Marking a random sample of student homework and exams by other faculty members.
5.Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • The course material and syllabus are periodically reviewed and compared with similar materials taught in similar departments in other universities. • Taking necessary measures to implement the findings of the comparison and check up processes. • The following points may help to get the course effectiveness: * Student evaluation. * Course report. * Program report. * Program self-study.

Level Four

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Atomic Physics 403253

Course Specification

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

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

A Course Identification and General Information

1. Course title and code : **ATOMIC PHYSICS, 403253**
2. . Credit hours:- **3 Cr.**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Undergraduate
4. Name of faculty member responsible for the course **Dr Mohamed BOUSTIMI**
5. Level/year at which this course is offered **4th level** of the second year see plan
6. Pre-requisites for this course (if any) **OPTICS, 433231** **MATHEMATICAL PHYSICS 1, 433240**
7. Co-requisites for this course (if any) **Some knowledge in electromagnetism**
4. Location if not on main campus

B Objectives

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

The student should understand at least the major concepts of the following and be able and to demonstrate his understanding in Lab experiments and when resolving physical problems:

- Einstein's postulate of relativity
- UV catastrophe (thermal radiation treated with classical physics)
- Energy is quantified (photons)
- Relate the linear momentum of a photon to its energy or wavelength, and apply linear momentum conservation to simple processes involving the emission, reflection, or absorption of electrons
- Describe a typical photoelectric effect experiment
- Sketch or identify a graph of stopping potential versus frequency for a photoelectric-effect experiment
- The concept of energy levels for atoms
- State the assumptions and conclusions of the Bohr model for the hydrogen atom
- The concept of De Broglie wavelength
- Schrodinger equation for the Hydrogen atom (quantum numbers to describe the electron)

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)

- Explain the syllabus of the course in the beginning of the semester. And pointed the importance of modern physics to understand Quantum mechanics and molecular physics.
- Make a soft (in power point and/or pdf) and hard copy of lectures
- Highlighting the day life applications whenever exist
- Resolving and discussing some selected problems in each chapter
- check for the latest discovery in the field of quantum mechanics and its applications
- Indicate the links between experiment lab and the 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

THE SPATIAL THEORY OF THE RELATIVITY	No of Weeks	Contac thours
1- reference frame		
2- inertial reference frame		
3- Galilean relativity		
4- Einstein's postulate of relativity		
5- Lorentz transformations		
6- relativistic velocity transformations		
7- transformation of energy		
8- Doppler effect	**1 week**	
BLACK BODY RADIATION		
1- radiation of heated objects		
2- thermal radiation		
3- cavity radiation treated with classical physics		
4- UV catastrophe		
5- Planck's solution		
6- quantum of energy	1 week	
PARTICLE PROPERTIES OF WAVES		
1- The photoelectric effect		

2- The quantum theory of light		
3- X-ray diffraction		
4- The Compton effect		
5- Pair production		
6- Gravitational red shift	1Weeks	
WAVE PROPERTIES OF PARTICLES		
1- De Broglie waves		
2- Wave function		
3- De Broglie wave velocity		
4- Phase and group velocities		
5- The diffraction of particles		
6- The uncertainty principle		
7- Applications of the uncertainty principle, The wave-particle duality	1 week	
ATOMIC STRUCTURE		
1- Atomic models		
2- Alpha-particle scattering		

3- The Rutherford scattering formula		
4- Nuclear dimensions		
5- Electron orbits		
6- Atomic spectra		
7- The Bohr atom		
8- Energy levels and spectra		
9- Nuclear Motion		
10- Atomic excitation,		
11- The correspondence Principle	2 weeks	
QUANTUM MECHANICS		
12- Classical mechanics is an approximation of quantum mechanics		
13- The wave equation		
14- Schrodinger equation: time dependent form		
15- Linearity and superposition		
16- Expectation value		
17- Schrodinger equation: steady state form		

18- Particle in a box		
19- Finite potential well		
20- Tunnel effect		
21- Harmonic oscillator	2 weeks	
QUANTUM THEORY OF THE HYDROGEN ATOM		
1- Schrodinger equation for the Hydrogen atom		
2- Separation of variables		
3- Quantum numbers		
4- The normal Zeeman effect		
5- Electron probability density		
6- Radiative transition		
7- Selection rules	2 weeks	
MANY-ELECTRON ATOM		
1- Electron spin		
2- Spin-orbit coupling		
3- The exclusion principle		
4- Electrons configurations		
5- The periodic table		
6- Hund's Rule		
7- Total angular momentum		
8- LS coupling		
9- jj coupling		

10- one-electron spectra		
11- two-electron spectra		
12- X-ray spectra	3 weeks	
MOLECULES H_2		
1- Molecular formation		
2- Electron sharing		
3- The H_2^+ molecular ion		
4- The H_2 molecule		
5- Molecular orbitals		
6- Hybrid orbitals		
7- Carbon-carbon bonds		
8- Rotational energy levels		
9- Vibrational energy levels		
10- Electronic spectra of molecules	2 weeks	

2 Course components (total contact hours per semester):			
Lecture: **42 h**	Tutorial:	Practical/Fieldwork /Internship: 30 h	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) **8 office hours weekly**

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

- **The first three chapters are devoted to the theory of atoms. An innovation in an introductory modern physics course is a largely descriptive account of the general relativity; it is included in light of recent technological advances that have allowed careful and precise experiments and have stimulated new interest in the field.**
- **Quantum theory is the central theme of the next five chapters. Chapter 4 summarizes the experimental findings that ultimately led to broad acceptance of energy quantization. Chapter 5 is an account of the Bohr model of the hydrogen atom. The concept of cross section is introduced and illustrated in connection with Rutherford scattering. Chapter 6, The de Broglie hypothesis and experiments that validated it.**
- **Elementary quantum mechanics is the subject matter of Chapters 7 and 8. The Schrödinger equation is introduced in Chapter 7 and the standard one-dimensional examples- infinite and finite square wells, barrier penetration, and the harmonic oscillator are presented. Chapter 8 addresses primarily the quantum mechanics of the hydrogen atom. The formal solution of the Schrödinger equation in spherical coordinates is well beyond the mathematical sophistication of the student whose background is a one-year course in differential and integral calculus.**

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

- **In-class lecturing where the previous knowledge is linked with the current and future topics as well as a brief account of instrumentation for radiation physics and astrophysics .**
- **Homework assignments and solving the problems of each chapter.**
- **Tutorial discussions and laboratory practice (conducting experiments and writing reports)**

(iii) Methods of assessment of knowledge acquired

- **In class short MCQs quizzes.**
- **Major and final exams.**
- **Evaluation of the problems solutions of each chapter**

b. Cognitive Skills
(i) Cognitive skills to be developed • **Solve problems on the theory of relativity, quantum theory and elementary quantum mechanics.** • **Identify the recent technological advances that have allowed careful and precise experiments and have stimulated new interest in the field.** • **Summarize the experimental findings that ultimately led to broad acceptance of energy quantization.** • **Validate de Broglie hypothesis and experiments.** • **Apply the concepts of the theory of relativity and quantum theory in our life practice.** • **Introduce Schrödinger equation and the standard one-dimensional examples- infinite and finite square wells, barrier penetration, and the harmonic oscillator.**
(ii) Teaching strategies to be used to develop these cognitive skills • **Work independently and as a part of team.**
(iii) Methods of assessment of students cognitive skills • **writing group reports** • **Solving problems in groups at the end of each chapter**
c. Interpersonal Skills and Responsibility
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed • **Assessment of the solution of problems** • **Grading homework assignments**
(ii) Teaching strategies to be used to develop these skills and abilities • **Use the computational tools.** • **Write reports.** • **Communicate results of the work to other**
(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility **Evaluate written summary reports**
d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.**Not applicable**
(ii) Teaching strategies to be used to develop these skills **Not applicable**
(iii) Methods of assessment of students numerical and communication skills **Not applicable**
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

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	**Class activates (class quizzes, homework, solving problems and written summary reports).**	**weekly**	**20 %**
2	**Major examination I**	**6**	**15 %**
3	**Major examination II**	**12**	**15 %**
4	**Final examination**	**18**	**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 6 hr/ week.**

E Learning Resources

1. Required Text(s)
• 2. Essential References **Frank J. Blatt, Modern Physics. International Edition 1992 by McGraw –Hill Book Co.** • **Arthur Beiser, Concepts of Modern Physics (5th Ed.), 2000, by McGraw-Hill, Inc**
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)
4-.Electronic Materials, Web Sites etc **Websites on the internet relevant to the topics of the course**
5- Other learning material such as computer-based programs/CD, professional standards/regulations **Multi media associated with the text book and the relevant websites**

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 with at least 25 seats.** • **Auditorium of a capacity of not less than 100 seats for large lecture format classes.** • **Laboratory of physics with at least 25 places**
2. Computing resources • **Computer room containing at least 15 systems.** • **Scientific calculator for each student.**
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 • **Course evaluation by student.**
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department • **Peer consultation on teaching.** • **Departmental council discussions.** • **Discussions within the group of faculty teaching the course**
3 Processes for Improvement of Teaching • **Peer consultation on teaching.** • **Departmental council discussions.** **Discussions within the group of faculty teaching the course**

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) • **Providing samples of all kinds of assessment in the departmental course portfolio of each course.** • **Assigning group of faculty members teaching the same course to grade same questions for various students**.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • **The course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental and higher councils.** • **The head of department and faculty take the responsibility of implementing the proposed changes.**

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Mathematical Methods (II) 403242

Course Specification

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

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

A Course Identification and General Information

1. Course title and code: Mathematical Methods (II) (Phys. 242)
2. Credit hours: - 3 Credit Hours
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course: Dr. Abdel Khaleq Alsmadi
5. Level/year at which this course is offered: Third year
6. Pre-requisites for this course (if any): Pre-Requisite: PH 240
7. Co-requisites for this course (if any): Non
8. Location if not on main campus :- Within The University Campus

B Objectives

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

1. Giving the students the opportunity to master many of the mathematical techniques necessary for follow-up courses in mathematics, physics and chemistry.
2. Training the students how to think about the physical phenomena in mathematical terms.
3. Develop an intuitive feeling for the precise mathematical formulation of physical problems and for the physical interpretation of the mathematical solutions.
4. Be familiar with the mathematical formulae of this course that frequently appear in physics problems.
5. Demonstrate the applications of mathematical methods to a variety of problems in physics.
6. Introducing some special differential equations such as Bessel and Legendre equations and applying the concept of series solution to differential equations to familiarize the students to some special functions such as Bessel and Legendre functions.
7. Apply the concepts of partial differential equations such as Laplace and wave equations, solution of some differential equation by series method, other special functions such as Gamma and Beta functions, in addition to function of complex variables to real problems in physics.
8. Develop the learning skills of the students in using computers as an educational tool, problem solving and demonstration.
9. Enhance the students' analytical, reasoning, and self-learning skills.
10. Be familiar with the methods of solving ordinary differential equations.
11. Be able to deal with real problems using analytical methods.

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. Implementing different teaching methods.
2. Encourage the students to use different learning resources including the use of the World Wide Web (WWW) search engines.
3. Make use of programs that already available like mathematica for numerical solutions and as a double check for the final answers of the analytical problems.

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
Topics		
VI) Solution of differential equation by series method	4 weeks	12 hours
1. Bessel equation and Besssel functions		
2. Legendre equation and Legenre functions		
3. Hermite equation and Hermite functions		
4. Lageure equation and Lageure functions		
5. Other special differential equations and their special functions		
VII) Gamma and Beta functions	3 weeks	9 hours
1. Definition of Gamma function		
2. Recurrence relation		
3. Gamma function of negative numbers		
4. Important formula of Gamma functions		
5. Definition of Beta function		
6. Important formula of Beta functions		
7. applications on Gamma and Beta functions		
VIII) Partial differential equations	3.5 weeks	10 hours

1. Laplace equation		
2. Wave equation		
3. Vibrary membrane equation		
IX) Function of complex variables		
1. Analytic functions	3.5 weeks	11 hours
2. Contour Integral		
3. Residue theorem and finding residues		
4. Evaluation of integrals by Residue theorem		

2 Course components (total contact hours per semester):			
Lecture: 42 hrs	Tutorial: zero hrs	Practical/Fieldwork /Internship:	Other: Office hours : 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)
This actually depends on the student's level, study skills and habits, but in general three hours per week are sufficient.

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 when they complete the course is as follows:

1. Be familiar with the notations of each subject in the course.
2. Be able to recognize the type of a given differential equation and to choose the suitable method for solving it.
3. Be able to solve differential equation by series method and to compare the solution with other solutions obtained by other methods.
4. Be familiar with some special functions such as Besssel, Legendre. Hermite and Lageure functions.
5. Be familiar with gamma and Beta functions and solve integrals that are related to these functions.
6. Be familiar with some partial differential equations such as Laplace and wave equations
7. Show ability to decide whether a given series is convergent or divergent.
8. Be able to deal with functions of complex variables.
9. Be familiar with the residue theorem and integrals by this theorem.

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

1. Lecturing.
2. Solving examples during the lecture time.
3. Using different teaching methods.
4. Build a problem solving strategy.
5. Strengthening basic proof techniques.
6. Improve ability to integrate information and ideas.
7. Open discussions.

(iii) Methods of assessment of knowledge acquired

1. Homework assignments.

2. Quizzes. 3. Term paper. 4. Exams.
b. Cognitive Skills
(i) Cognitive skills to be developed 1. Develop analytic skills. 2. Develop problem-solving skills. 3. Develop ability to think creatively. 4. Improve memory skills. 5. Improve mathematical skills.
(ii) Teaching strategies to be used to develop these cognitive skills 1. Develop ability to synthesize and integrate information. 2. Encourage the students to use different learning resources. 3. Writing the final answer in concise form when possible. 4. Writing an equation/physical law in wards. 5. Using shortest way to reach the final answer. 6. Using appropriate symbols that can be easily memorized.
(iii) Methods of assessment of students cognitive skills 1. Oral questions. 2. Presentations. 3. Term paper. 4. Quizzes. 5. Problem solving.
c. Interpersonal Skills and Responsibility
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed 1. Develop ability to work independently. 2. Develop ability to work productively with others. 3. Improve self-esteem. 4. Develop leadership skills.
(v) Teaching strategies to be used to develop these skills and abilities 1. Homework assignment for each group of the students. 2. Homework assignments that should be worked out independently. 3. Cooperative learning.

4. Microteaching.
(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility 1. Marking the home works. 2. Asking the members of each group about the content of their assignment. 3. Working closely with the different groups.
d. Communication, Information Technology and Numerical Skills
(i) Description of the skills to be developed in this domain. 1. Perform effective communication with colleagues and faculty members. 2. Ability to use programs designed for numerical computation. 3. Problem solving and ability to interpret the results. 4. Ability to use the World Wide Web (WWW) search engines.
(ii) Teaching strategies to be used to develop these skills *1.* Problem based learning. 2. Additional lectures on numerical techniques. 3. Exposing the students to problems that can only be solved numerically.
(iii) Methods of assessment of students numerical and communication skills *1.* Give the students homework assignments on problems that can be solved numerically. *2.* Ask the students to search the internet for the solution of a specific problem. 3. Using the computer to construct three dimensional graphs.
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	First Exam	6th week	20
2	Second Exam	11th week	20
3	In-Class Problem Solving	At the end of each chapter	10
4	Home works and quizzes	Every week	10
5	Final exam	Allocated by registration	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) Five office hours per week. If some students are busy during these times, they can arrange with me (lecturer) for other times.

E Learning Resources

1. Required Text(s): Mathematical methods in the physical sciences. Third edition, by Mary L. Boas
2. Essential References: Mathematical Methods for Physicists by G. Arfken
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) 1. Mathematical Methods by M.C. Potter and J. Goldberg. 2. Mathematical Physics by E. Butkov 3. Introduction to Mathematical Physics by N. Laham.
4-.Electronic Materials, Web Sites etc

3. www.mpipks-dresden.mpg.de/~jochen/methoden/outline.html 4. People.uncw.edu/hermanr/phy311/mathphysbook/index.html
5- Other learning material such as computer-based programs/CD, professional standards/regulations. The following programs are essential for numerical computing and graphing. 1. Mathematica 2. Matlab. 3. Origin.

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.) 1. Lecture room for 30 students. 2. Data show.
2. Computing resources 3. Computer room for 20 students equipped with computers and access to the internet. 4. Software for numerical computing.
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 Confidential instructor evaluation questionnaire by the end of the course.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department 1. Course report.

2. Observations and assistance from colleagues.
3 Processes for Improvement of Teaching • Review the student's feedback and work on the weak points. • Use combination of different teaching methods.
6 Processes for Verifying Standards of Student Achievement • Check marking by another teaching staff of a sample of student work. • Peer reviewing of tests remarking and sample of student assignments.
7 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Regular evaluation of students' feedback. • Review the course outline and teaching methods. • Submit a course report to the curriculum committee in the department to discuss the content of the course and its connection with other courses. • Annual improvement and updating the course based on the outcomes of the reviewing process.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Name: Electrical Properties of Biological Solutions

Course Code: 433296-2

2011-2012

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 Science / Physics Department

A Course Identification and General Information

1. Course title and code: Electrical Properties Of Biological Solutions (**433296-2**)
2. Credit hours: - 2 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Medical Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Fourth level/Second year
6. Pre-requisites for this course (if any) Devices measurements (433285-3)
7. Co-requisites for this course (if any)
8. Location if not on main campus :- Within The University Campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The objectives of this course are to give the students the basic knowledge about the laws of dielectric behavior of biological molecules in solution **For students undertaking this course, the aims are to:** • **Introduce the fundamental information about the dielectric theory its laws.** • **Define of capacitance and capacitor with dielectrics.** • **Study the polarization in material and its types (electronic polarization, orientational polarization and ionic polarization).** • **Give students the essential concepts of dielectric constant and complex dielectric constant equations.** • **Study the equations of Debye equation for the complex dielectric constant.** • **Introduce the main information about the relaxation time theory.** • **Analyse the distribution of relaxation time for different relaxation times.** • **Enable the students to understand the impedance of biological tissues and dependence frequency on impedance.** • **Introduce the student the electrical resistance of cells and tissue and different practical measurements of impedance of biological tissues and.** • **Describe the dielectric behaviour of some biological molecules such as proteins , DNA, blood red blood cells and its hemoglobin.** • **Enable the students to have an idea about cell membrane potential, Nernest equation, conductance, action potential, resting membrane potential .** **The overall goal is to use the scientific method to come to understand the enormous variety of dielectric behavior of biological molecules in solution phenomena in terms of a few relatively simple laws**
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) 4. Explain strategy of the course in the beginning of the semester 5. Outlines of the physical laws, principles and the associated proofs. 6. Highlighting the day life applications whenever exist. 7. Encourage the students to see more details in the international web sites and reference books in the library. 8. Discussing some selected problems in each chapter. 9. Cooperate with different institution to find how they deal with the subject 10. Renew the course references frequently 11. 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		
Topic	No of Weeks	Contact hours
Dielectric theory, fundamental information about the dielectric theory its laws, susceptibility, conductivity,	1	2 hrs
Polarization of material and its types (electronic polarization, orientational polarization and ionic polarization).	1	2 hrs
Dielectric constant and complex dielectric constant equations.	1	2 hrs
Dielectric behaviour of material in Direct Current (DC) circuit.	1	2 hrs
Dielectric behaviour of material in Alternate Current (AC) circuit.	1	2 hrs
Equations of Debye equation for the complex dielectric constant, relative permittivity, dielectric loss factor, dielectric loss tangent.	1	2 hrs
Relaxation time theory and the distribution of relaxation time for different relaxation times equations.	1	2 hrs
Physics of membrane of cell and tissue and electrical model of cells and tissue- physical equations cell membrane.	1	2 hrs
Impedance of biological tissues and dependence frequency on impedance.	1	2 hrs
Different practical techniques for measurements of impedance of biological tissues e.g: Wein's bridge, four electrodes bridge.	1	2 hrs
Study Cole-Cole diagram and the its interpretation also, training the student how to sketch Cole-Cole diagram beside its physical meaning.	1	2 hrs
Examples of dielectric behaviour of some biological molecules such as proteins, DNA, blood red blood cells and its hemoglobin.	1	2 hrs
Cell membrane potential, Nernest equation, conductance, action	1	2 hrs

potential, resting membrane potential .		

2 Course components (total contact hours per semester):			
Lecture: 26 hr	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

knowledge that students should know and understand when they complete the course are as follow:

(vi) **Learning fundamentals in dielectric theory, fundamental information about the dielectric theory its laws, susceptibility, conductivity.**

(vii) **Understanding the physics of dielectric theory and their applications mentioned in the text.**

(viii) **Improving logical thinking.**

(ix) **To use mathematical formulation to describe the physical principle or phenomena**

(x) **Ability to explain how things work.**

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

13. Demonstrating the basic information and principles through lectures and the achieved applications
14. Discussing phenomena with illustrating pictures and diagrams
15. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
16. Tutorials
17. Revisit concepts
18. Discussions
19. Brain storming sessions
20. Start each chapter by general idea and the benefit of it;
21. Learn the student background of the subject;
22. Show the best ways to deal with problem;
23. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

9. Solve some example during the lecture.
10. Exams:
    a) Quizzes
    b) Short exams (mid term exams)
    c) Long exams (final)
    d) Oral exams
11. Discussions with the students.
12. Ask the student to clear the misunderstanding of some physical principle.
13. Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

6. How to use physical laws and principles to understand the subject
7. How to simplify problems and analyze phenomena
8. Analyse and explain natural phenomena.
9. Ability to explain the idea with the student own words.
10. Represent the problems mathematically.

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

8. Preparing main outlines for teaching

9. Following some proofs
10. Define duties for each chapter
11. Home work assignments
12. Encourage the student to look for the information in different references
13. Ask the student to attend lectures for practice solving problem
14. Ask the student to do small research.

(iii) Methods of assessment of students cognitive skills

5. Midterm's exam. Exams, short quizzes
6. Asking about physical laws previously taught
7. Writing reports on selected parts of the course

Discussions of how to simplify or analyze some phenomena

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

6. Learn how to search the internet and use the library.
7. Learn how to cover missed lectures.
8. Learn how to summarize lectures or to collect materials of the course.
9. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
10. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.

- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.

give students tasks of duties

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

6. Quizzes on the previous lecture
7. Checking report on internet use and trips
8. Discussion
9. The accuracy of the result gained by each group will indicate good group

work

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.

5. Computation
6. Problem solving
7. Data analysis and interpretation.

Feeling physical reality of results

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

12. Know the basic mathematical principles.
13. Use the web for research.
14. Discuss with the student.
15. Exams to measure the mathematical skill.
16. Clear the weakness point that should be eliminated.
17. Encourage the student to ask for help if needed.
18. Computational analysis.
19. Data representation.
20. Focusing on some real results and its physical meaning.
21. Lectures for problem solution.
22. 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

7. **Their interaction with the lectures and discussions.**
8. **The reports of different asked tasks.**
9. **Homework, Problem solutions assignment and exam should focus on the understanding.**
10. **Results of computations and analysis.**
11. **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 **Frequently not permitted to be existed in practical colleges.**
(ii) Teaching strategies to be used to develop these skills • **Student are emphasizing to search through the internet about all concepts that they are learned on class.** • **Student are emphasizing to look for the concepts that they are learned on class on library by themselves.**
(iii) Methods of assessment of students psychomotor skill

5. Schedule of Assessment Tasks for Students During the Semester			
Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessmen t
1	Midterm 1	5^{th} week	10
2	Midterm 2	10^{th} week	10
3	In-Class Problem Solving	13^{th},7^{th} week	10
4	project	12^{th} week	10
5	Homework	Every week	10
6	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) 4 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] Handbook of physics in medicine and biology, Robert Splinter, CRC Press Taylor & Francis Group, 2010. [2] biophysics, Roland Glaser, spring-Verlag Berlin Heidelberg, New York, 5th, 2001. [3] Physics for scientists and engineering by Serway 7Th edition
4-.Electronic Materials, Web Sites etc http://www.youtube.com/watch?v=PTaSfpBJgCE&feature=related http://www.youtube.com/watch?v=Fjy_hVpWgWs&feature=related http://www.youtube.com/watch?v=lP57gEWcisY&feature=related http://www.youtube.com/watch?v=HuZLh_mS6iE
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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 Laboratory for optics (there is a special course for laboratory related to electromagnetic)
2. Computing resources - Computer room - 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 - Midterm and final exam. - Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (d) Course report (e) Program report (f) Program self study - 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. - Feedback evaluation of teaching from independent organization.
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 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. Add some subject and cut off others depending on the new discoveries in physics.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

COURSE NAME: Physics of Biomembranes & Macromolecules

COURSE NAME: 433298-3

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Physics of Membranes and Macromolecules (433298-3)
2. Credit hours: - 3 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Medical Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Fourth Level/ Second Year
6. Pre-requisites for this course (if any) Pre-Requisite 431211-4 (Cell Biology)
7. Co-requisites for this course (if any)
8. Location if not on main campus :- Within The University Campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The course provides a general introduction within cell biology, a quantitative knowledge about cellular processes. The students will learn the properties of the cell membrane and understand the relationship between structure and function role of the cell membrane, the basic mechanism of cellular processes, diffusion, Fick's law, passive and active transport, osmosis through the cell membrane of plant and animal cells, information about the tools, that investigation the structure of proteins, nucleic acids (DNA, RNA) and membranes (e.g cell walls), survey of experimental methods for studying cellular properties. The overall goal is to use the scientific method to come to understand the enormous variety of medical applications of biological membranes and different techniques used for membranes' investigation.
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) 12. Explain strategy of the course in the beginning of the semester 13. Outlines of the physical basis, models and techniques. 14. Highlighting the day life applications whenever exist. 15. Encourage the students to see more details in the international web sites and reference books in the library. 16. Discussing some selected items in each chapter. 17. Cooperate with different institution to find how they deal with the subject 18. Renew the course references frequently 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 :- The course consists of three parts		
Topics	No of Weeks	Contact hours
1.The structure, properties and function of the cell membrane	**4W**	**12**
structure of cell		
Fluid Mosaic model		
The Function of the Cell Membrane		
The chemical structure of Lipids, Fatty Acids, Carbohydrates, Cholesterol, and their functions role		
Chemical structure of Proteins and their Functions		
2. Transport Mechanisms in Membrane	**5W**	**15**
Transport mechanisms, Passive transport, Active Transport, Bulk transport (Vesicles).		
Diffusion , factors affect diffusion, Facilitated Diffusion, Transport of protein		
First and second law Fick's laws of diffusion, Temperature dependence of the diffusion coefficient, Ionic equilibrium and Nernst Equation, The basic laws in relation to Action potential, Passive membrane models and cable theory, The method of Voltage Clamp, The method of Patch Clamp, The equation of Hodgkin- Huxleys' Action potential, Ion channels.		
Filtration, Osmosis, Osmotic Pressure, solution , type of solution, cells in different kinds of solution, The Na+K+ pump.		
3.MACROMOLECULES OF BIOPHYSICS	**4W**	**12**
Classification of macromolecules		
Isolated of proteins by Centrifugation and Electrophoresis		
Determination of molecular weight by chromatography		
Characterization of proteins by IR- UV, and Raman spectroscopy		
Methods to determine protein structures by X-rays, Nuclear magnetic resonance spectroscopy.		

2 Course components (total contact hours per semester):			

Lectures: 26 hr	Tutorial: 13	Practical/Fieldwork/Internship	
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 evaluate learning outcomes in the domain concerned.

a. Knowledge

(xii) knowledge that students should know and understand when they complete the course are as follow:
(xiii) To understand and apply concepts of fundamental physics to biological
(xiv) systems, the physical aspects of the functioning of membranes
(xv) To understand of the transport mechanisms, How particles get across cell
(xvi) membranes according to its size, shape, texture and chemical composition.
(xvii) To understand the bio molecular structure (proteins) using X-ray diffraction
(xviii) electron microscopy - IR - Raman and laser spectrometry - UV-visible
(xix) spectroscopy, NMR.
(xx) Improving logical thinking.
(xxi) To use mathematical formulation to describe the physical principle of membranes' preparation
(vi) Ability to explain how things work in medical applications.

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

24. Demonstrating the basic information and principles through lectures and the achieved applications
25. Discussing phenomena with illustrating pictures and diagrams

26. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
27. Tutorials
28. Revisit concepts
29. Discussions
30. Brain storming sessions
31. Start each chapter by general idea and the benefit of it;
32. Learn the student background of the subject;
33. Show the best ways to deal with problem;
34. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

14. Discuss some examples during the lecture.
15. **Exams:**
    a) Quizzes
    b) Short exams (mid term exams)
    c) Long exams (final)
    d) Oral exams
16. Discussions with the students.
17. Ask the student to clear the misunderstanding of some physical principles.

Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

11. How to use physical principles to understand the subject
12. How to simplify and analyze phenomena
13. Analyse and explain natural phenomena.
14. Ability to explain the idea with the student own words.
15. Represent the problems mathematically.

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

15. Preparing main outlines for teaching

16. Following some proofs
17. Define duties for each chapter
18. Home work assignments
19. Encourage the student to look for the information in different references
20. 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

8. Midterm's exam. Exams, short quizzes
9. Asking about biological background previously taught
10. Writing reports on selected parts of the course

Discussions of how to simplify or analyze some phenomena

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

11. Learn how to search the internet and use the library.
12. Learn how to cover missed lectures.
13. Learn how to summarize lectures or to collect materials of the course.
14. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
15. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.

- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.

give students tasks of duties

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

10. Quizzes on the previous lecture
11. Checking report on internet use and trips
12. Discussion
13. The accuracy of the result gained by each group will indicate good group work

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.

8. Computation
9. Problem solving
10. Data analysis and interpretation.

Feeling physical reality of results

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

23. Know the basic biological principles.
24. Use the web for research.
25. Discuss with the student.
26. Exams to measure the knowledge and comprehensive skills.
27. Clear the weakness point that should be eliminated.
28. Encourage the student to ask for help if needed.
29. Computational analysis.
30. Data representation.
31. Focusing on some real results and its physical meaning.
32. Lectures for discussing some medical applications.
33. 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

12. Their interaction with the lectures and discussions.
13. The reports of different asked tasks.
14. Homework, Problem solutions assignment and exam should focus on the understanding.
15. Results of computations and analysis.
16. 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 skill

(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	Midterm 1	5^{th} week	10
2	Midterm 2	10^{th} week	10
3	In-Class Problem Solving	13^{th},7^{th} week	10
4	Project	12^{th} week	10
5	Homework	Every week	10
6	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) 2 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] Membrane Biophysics by H. Ti Tien and Angelica Ottova-Leitmannova, 3rd Eds,2010.
[2] Structural Biology with Biochemical And Biophysics Foundation by Mary Luckey, 1st edition, Cambridge University Press, 2008 [3] Cell Biology and Membrane Transport Processes by Michael Caplan, Intenernational Edition, Academic Press, 1994.
[4] Soft Condensed Matter Physics in Molecular and Cell Biology by W. C. K. Poon and D. Andelman, 1st Eds, Taylor and Francis, 2006.
4-.Electronic Materials, Web Sites etc - http://www.biotec.tu-dresden.de/cms/index.php?id=197 - http://www.northland.cc.mn.us/biology/biology1111/animations/transport1.html - http://www.physiologyweb.com/lecture_notes/membrane_transport/membrane_transport_processes_summary.html

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

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 Laboratory for optics (there is a special course for laboratory related to electromagnetic)
2. Computing resources - Computer room 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 - Midterm and final exam. Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (g) Course report (h) Program report (i) Program self study - 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. **Feedback evaluation of teaching from independent organization.**
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 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. Add some subject and cut off others depending on the new discoveries in physics.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Name: **Ultrasound in medicine**

Course Code: **433204-2**

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Ultrasound in Medicine
2. Credit hours: - 2 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Medical Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Fourth Level
6. Pre-requisites for this course (if any) Pre-Requisite PH101+Math101
7. Co-requisites for this course (if any)
8. Location if not on main campus :- Within The University Campus

B Objectives

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

The objectives of this course are to tease out the ultrasound waves properties from our everyday experience by specific examples of how ultrasound waves used in medical application especially imaging.

We want to be able:

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

7. To understand basic Fundamentals of ultrasound waves: Physics of wave motion, ultrasound intensity, and attenuation of ultrasound.
8. The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)
9. To describe, in words, the ways in which various concepts in ultrasound come into play in particular situations; to represent ultrasound generation and principles of different medical applications.
10. To analyse ultrasound systems using a required basics
11. To understanding behaviour of different modes of ultrasound imaging.

The overall goal is to study the physical characteristics of ultrasound, generation methods and different medical applications as a safe medical imaging technique.

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)

19. Explain strategy of the course in the beginning of the semester
20. Outlines of the physical laws, principles and the associated proofs.
21. Highlighting the day life applications whenever exist.
22. Encourage the students to see more details in the international web sites and reference books in the library.
23. Discussing some selected problems in each chapter.
24. Cooperate with different institution to find how they deal with the subject
25. Renew the course references frequently

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)

Topics to be achieved		
Topics	No. Of Weeks	Contact hours
Ultrasound Waves:	2 weeks	1.5 hr/week
1- Wave Motion		
2- Wave Characteristics		
3- Velocity of Ultrasound		
4- Ultrasound Intensity		
5- Acoustic Impedance		
6-Ultrasound Wavefront		
7- Attenuation of Ultrasound		
Ultrasound Transducers:	2 weeks	1.5 hr/week
1- Pizoelectric Effect		
2- Transducer Design		
3- Frequency response of a transducer		
4- Focused Transducer		
5- Ophthalmic and Doppler Probes		
Ultrasound Display System:	6 weeks	1.5 hr/week
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		
The Doppler Effect:	2 weeks	1.5 hr/week
1- Measurement of the frequency shift		
2- Measurement of Reflection from Media of Different Acoustic Impedances		

2 Course components (total contact hours per semester):			
Lecture: 36 hr	Tutorial:	Practical/Fieldwork	Other:

		/Internship:	Office hours :

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
(xxii) knowledge that students should know and understand when they complete the course are as follow: (xxiii) Learning fundamentals of ultrasound wave physics (xxiv) Understanding the design of ultrasound transducer and their applications mentioned in the text. (xxv) Improving logical thinking. (xxvi) To use mathematical formulation to describe the physical principle of different imaging modes Ability to explain how things work.
(xxvii) Teaching strategies to be used to develop that knowledge 35. Demonstrating the basic information and principles through lectures and the achieved applications

36. Discussing phenomena with illustrating pictures and diagrams
37. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
38. Tutorials
39. Revisit concepts
40. Discussions
41. Brain storming sessions
42. Start each chapter by general idea and the benefit of it;
43. Learn the student background of the subject;
44. Show the best ways to deal with problem;
45. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

18. Solve some example during the lecture.
19. Exams:
    a) Quizzes
    b) Short exams (mid term exams)
    c) Long exams (final)
    d) Oral exams
20. Discussions with the students.
21. Ask the student to clear the misunderstanding of some physical principle.

Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

16. How to use physical laws and principles to understand the subject
17. How to simplify problems and analyze phenomena
18. Analyse and explain natural phenomena.
19. Ability to explain the idea with the student own words.
20. Represent the problems mathematically.

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

21. Preparing main outlines for teaching
22. Following some proofs
23. Define duties for each chapter
24. Home work assignments
25. Encourage the student to look for the information in different references
26. 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

11. Midterm's exam. Exams, short quizzes
12. Asking about physical laws previously taught
13. Writing reports on selected parts of the course

Discussions of how to simplify or analyze some phenomena

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

16. Learn how to search the internet and use the library.
17. Learn how to cover missed lectures.
18. Learn how to summarize lectures or to collect materials of the course.
19. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
20. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.

- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.

give students tasks of duties

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

14. Quizzes on the previous lecture
15. Checking report on internet use and trips
16. Discussion
17. The accuracy of the result gained by each group will indicate good group work

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.

11. Computation
12. Problem solving
13. Data analysis and interpretation.

Feeling physical reality of results

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

34. Know the basic mathematical principles.
35. Use the web for research.
36. Discuss with the student.
37. Exams to measure the mathematical skill.
38. Clear the weakness point that should be eliminated.
39. Encourage the student to ask for help if needed.
40. Computational analysis.
41. Data representation.
42. Focusing on some real results and its physical meaning.
43. Lectures for problem solution.
44. 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 17. Their interaction with the lectures and discussions. 18. The reports of different asked tasks. 19. Homework, Problem solutions assignment and exam should focus on the understanding. 20. Results of computations and analysis. 21. Comments on some resulting numbers.
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

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessmen t
1	Midterm 1	5^{th} week	10
2	Midterm 2	10^{th} week	10
3	In-Class Problem Solving	13^{th},7^{th} week	10
4	project	12^{th} week	10
5	Homework	Every week	10

6	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) 4 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] Fundmentals of Ultrasonographic techniques by J. D. Wicks and K. S. Howe [2] Basic Physics and Technology of Medical Diagnostic Ultrasound by M. Hussey
4-.Electronic Materials, Web Sites etc - http://www.physicsclassroom.com - http://www.brooksidepress.org/Products/Military_OBGYN/Ultrasound/basic_ultrasound.htm
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.) - Lecture room for 30 students - Library
2. Computing resources - Computer room - 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 - Midterm and final exam. - Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (j) Course report (k) Program report

(l) Program self study

- 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)

- The instructors of the course are checking together and put a unique process of evaluation
- Check marking of a sample of papers by others in the department.

Feedback evaluation of teaching from independent organization.

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

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

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

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

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

Level Five

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Quantum Mechanics (I) 403344

Course Specification

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

Institution: Umm AL-Qurra University
College/Department: Faculty of Science / Physics Department

A. Course Identification and General Information

Course Title and Code: **Quantum Mechanics I (344)**
Credit Hours: 4 Cr. Hrs
Program (s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
Name of Faculty Member Responsible For The Course Dr. Roshdi Seoudi Mohamed Awed
Level/year at which this course is offered 5^{th} Level-3^{th} year
Pre-requisites for this course (if any) Atomic Physics (253) and Math Phys. (II) (242)
Co-requisites for this course (if any): and Math Phys. (I) (240) and Optics (231)
Location if not on main campus : University campus

B Objectives

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

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 to the student 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. Expectations values, principle of superposition; Quantum mechanical operators: Three important quantum mechanical operators, eigen functions and eigen values, 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, Wave functions, hydrogen atom spectrum.

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)

i. Development of the quantum mechanics (I) is to examine the learning outcomes for the courses in the quantum mechanics stream. Categorize the subject matter and identify the important concepts in each category to be covered courses. These concepts were identified from the course outlines, which had themselves been developed over several years by a number of different academic staff.
ii. The students should be acquainted with the basics of physical optics (interference, superposition, light as a quantum mechanics field) and a good knowledge of algebra (vector spaces, Hilbert spaces, linear operators on these spaces). But all these concepts and tools will be brushed up in the beginning of the course.
iii. At the end of the course the students should be able to address all the following questions and solve problems related to these matters.
iv. Circulate this concept list to a range of quantum mechanics teaching staff and ask them to rank the 10 most important concepts for each course and to identify the misconceptions that students are likely to have about each of the concepts in the complete list.

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

Topics to be Covered :

Topics	No of Weeks	Contact hours
THE LIMITS OF CLASSICAL MECHANICS	**3**	**12**
1. Blackbody Radiation 2. Blackbody Radiation could not be explained by classical physics 3. The Planck Distribution and the Quantum of Energy 4. The Photoelectric Effect 5. The Compton Effect 6. Wave Prosperities and Electron Diffraction 7. De Broglie Waves are observed experimentally 8. The Bohr Atom and Derivation of Redberg constant		
WAVE PACKET AND THE UNCERTAINTY RELATION	**2.5**	**10**
1- Introduction of Complex Number, Special Integration, Fourier Transform and Integration, Fourier analysis and Wave Packet, Calculation of The Half Band Width. 2- Wave Packet and its Calculation of their Band Width. 3- The Propagation of the Wave Packet. 4- From Wave Packet to the Schrodinger Equation 5- The Uncertainty Relation. 6- Measurements the Position of The Electron (Hesinberg Microscope)		
SCHRODINGER WAVE EQUATION AND PROBABILITY INTERPRETATION	**2**	**8**
1. Interpretation of the Probability Wave Function 2. Importance of Phases 3. Probability Current and Conservation Low 4. Expectations Values and particle Momentum 5. Derivation of Momentum Operator **6.** Operators properties		
EIGEN FUNCTION AND EIGEN VALUES	**2**	**6**
1- Time Dependent Schrodinger Equation 2- Time Independent Schrodinger Equation 3- Concepts of Hamiltonian Operator 4- Solution of the Eigen Values Equation for the particle in a Box. 5- Derivation of some Physical Information from the Eigen Values Solutions. 6- Expansion Postulate and Its Physical Interpretation 7- Parity		
ONE-DIMENSIONAL POTENTIAL	**2.5**	**10**

1- The Potential Step: (Transmission and reflection) 2- Reflection and Transmission Fluxes 3- Potential Well 4- Even and Odd Solutions 5- The potential Barriers 6- Tunnelling Phenomena (cold emission) 7- The Harmonic Oscillator		
GENERAL CONSTRUCTION OF QUANTUM MECHANICS	**2**	**8**
1- Eigen Function and Eigen Values "Hamiltonian Operator" 2- Other Observable 3- Equation of Momentum Operator 4- Theory of Expansion and Parity with the Vector 5- Operator and Observable 6- Time dependence the Classical Limit of quantum Mechanics		
THE SCHRODINGER EQUATION IN THREE DIMENSIONS	**3**	**12**
1- The Central Potential 2- Consequences of Rotational Invariance 3- Invariance under Rotation about Z-Axis 4- Commutative Relation of the Angular Momentum 5- Separation of Variables in the Schrodinger Equation 6- The Radial Equation 7- The Hydrogen Atom 8- The Energy spectrum 9- The Degeneracy of the spectrum 10- The Radial Eigen Function		

2 Course components (total contact hours per semester):			
Lectures: 66 hr	Tutorial: 30	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) 6 Office hours 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:

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.

a. Knowledge

Knowledge that students should know and understand when they complete the course is as follow:

1- Teaching strategies to be used to develop that knowledge
2- Learning to be acquainted with the historical background of quantum mechanics, wave-particle description-the uncertainty principle and Schrodinger equation.
3- Understanding the physics of quantum 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.

(iii) Methods of assessment of knowledge acquired

1- Solve some example during the lecture.
2- Exams:
   i. Quizzes
   ii. Short exams (mid term 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.

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b. Cognitive Skills

(i) Cognitive skills to be developed

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

2- Ability to analyse the observed of the particles by solving the Schrodinger equation

3- Understand the theoretical treatments of quantum mechanics problems

4- 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

(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. 4- 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.
12- 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)

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5th week	10
2	Midterm 2	10th week	10
3	In-Class Problem Solving	13th,7th week	10
4	project	12th week	10

5	Homework	Every week	10
6	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. Feynman, Richard P., Robert Leighton, and Matthew Sands. The Feynman Lectures on Physics. Addison-Wesley, Reading, Massachusetts: 1965. Vol. 3: Quantum Mechanics.
2. Essential References 1- David A.B. Miller, ”Quantum Mechanics for Scientists and Engineers”, Cambridge University Press, 2008
3- Recommended Books and Reference 1- David J. Griffiths ”Introduction to Quantum Mechanics”, Pearson Prentice Hall, New York, USA, 2005 2- Amnon Yariv, ”Theory and applications of Quantum Mechanics”, Wiley, New York, USA, 1982 3- Claude Cohen-Tannoudji, Bernard Diu, Franck Lalo¨,”Mecanique Quantique”, Universit´ de Paris, France, 1973
4- Electronic Materials, Web Sites etc http://en.wikipedia.org/wiki/Quantum Mechanics/ http://www.dmoz.org/Science/Physics/Quantum Mechanics/

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 (Lecture rooms, laboratories, etc.) • Lecture room for 30 students • Library

• Laboratory for optics (there is a special course for laboratory related to quantum mechanics)
2. Computing resources • Computer room • 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 (e.g. 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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Solid State Physics (I) 403371

Course Specification

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

Institution:- **Umm AL-Qura University**
College/Department :- **College of Sciences / Physics Department**

A Course Identification and General Information

1. Course title and code: **Solid State Physics II (403371 , PH 371)**
2. Credit hours: - **3 Cr. hrs**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course: **Prof. Dr. Y.M. MOUSTAFA**
5. Level/year at which this course is offered: **3^{rd} year (6^{th} level)**
6. Pre-requisites for this course (if any): **Statistical thermodynamics (PH403312)**
7. Co-requisites for this course (if any) **Quantum mechanics 1 (PH 403344)**
8. Location if not on main campus :- **Physics Dept. – Faculty of Science, Within The University Campus**

B Objectives

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

This course introduces students to continue her/his research in solid state field. At the end of the course, the student must be able to :

- Gain knowledge and to be ready to study Solid State Physics II.
- Be familiar with the basic physics knowledge on Solid State Physics.
- Understand and compare the origin of bonding in materials.
- Discuss and classify the different crystal structures and symmetry operations.
- Understand and appreciate of the different types of defects in solid state and understand how it affect the physical properties of matter.
- Understand how X-Rays Diffraction can be used in studying the solid structure.
- Understand and appreciate of the physical laws governing the X-Rays diffraction by crystal.
- Understand the origin of lattice vibration and thermal property.
- Define and describe the Super conducting phenomena.
- Discuss the free electron theories in solids.
- Deep understanding of the importance of solids in our lives.
- Be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving)
- Describe, in words, the origin of the different properties of solids.

The overall goal is to understand the structure of crystalline material and the origin of the different properties and phenomena play role in solids and control its application.

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. Explain strategy of the course in the beginning of the semester
2. Outlines of the physical laws, principles and the associated proofs.
3. Highlighting the day life applications whenever exist.
4. Encourage the students to see more details in the international web sites and reference books in the library.
5. Discussing some selected problems in each chapter.
6. Cooperate with different institution to find how they deal with the subject
7. Renew the course references frequently
8. 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 :- Primarily for senior physics majors. Superconduction, X-Rays diffraction in crystals , free electron theory in metals ,band theory, thermal, electrical, dielectrical, magnetic properties of solids, and semiconductors		
Topics	No of Weeks	Contact hours
1- The atomic Theory and Binding Forces	**3 weeks**	**9 hrs**
1- Review of atomic structure		
2- Atomic binding and band theory		
3- Binding forces between atoms		
4- Lattice Energy Calculations		
5- Types of bonds		
6- Nucleation and growth kinetic		
7-Experimental methods of crystal growth		
2- Crystalline Structure	**2 weeks**	**6 hrs**
1- LONG RANGE AND SHORT RANG ORDER		
2- The crystalline state		
3- Basic definitions of crystallography		
4- The seven crystal systems		
5- WIGNER SEITZ PRIMITIVE CELL		
6- SYMMETRY ELEMENTS OF CRYSTALS	**1 weeks**	**3 hrs**
7- IMPORTANT PLANE SYSTEMS IN A CUBIC CRYSTALS		
8- MILLER'S INDICES FOR CRYSTAL PLANES,		

3- Crystals Properties	3 weeks	9 hrs
1- Crystal Directions and distance between crystal plans		
2- Zone , Zone Axis and angles between zones		
3- Atomic structure of crystals		
4- Cubic and hexagonal close-packed		
5- Characteristic of FCC and BCC structure		
6- The crystal structure of some simple crystals		
4- Structural Defects in Crystals		
1- Point defects and Free energy of a crystal	2 weeks	6 hrs
2- Point defects in ionic crystals		
3- Line defects and types of dislocation		
4- Planer defects		
5- Determination of vacancies concentration and the activation energy		

5-X-Rays Diffraction in Crystals	2 week	6 hrs
1- Used rays in studying crystal structure		

2- Generation and properties of X-rays		
3- X-Rays scattering from an atom		
4- X-Rays scattering from a crystal and Reciprocal lattice		
6- Lattice Vibrations	**2 weeks**	**6 hrs**
1- Elastic waves		
2- MODES OF VIBRATIONS AND DENSITY OF STATES OF A CONTINUOUS MEDIUM		
3- THE PHONON		
4- ELASTIC AND NON-ELASTIC SCATTERING		
5- LATTICE WAVES OF ONE-ATOMIC LINEAR CHAIN		
6- Vibration Modes of 1D diatomic		

2 Course components (total contact hours per semester):			
Lecture: 45 hrs	Tutorial: 10 hrs	Practical/Fieldwork /Internship:	Other: Office hours : 10 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)

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) knowledge that students should know and understand when they complete the course are as follow:

- Understanding the origin and types of binding in material.
- Learning fundamentals of crystallography and crystal defects.
- Improving logical thinking.
- To use mathematical formulation to describe the physical principle or phenomena.
- Ability to explain the structure of simple crystals.
- Learning theory and applications of the solid state.
- Methods of measurement and assessment of properties of solids

- 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:

- Blackboard
- 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; • Build a strategy to solve problem. • Encourage interactive learning and develop individualized interest

(iii) Methods of assessment of knowledge acquired
• Solve some example during the lecture.
• Exams**:**
    ○ Quizzes
    ○ Short exams (mid term exams)
    ○ Long exams (final)
    ○ Oral exams
• Discussions with the students.
• Ask the student to clear the misunderstanding of some physical principle.
• Ask quality question.
• Short essays and application projects

b. Cognitive Skills
(i) Cognitive skills to be developed • How to use physical laws and principles to understand the subject • How to simplify problems and analyze phenomena • Analyse and explain natural phenomena. • Ability to explain the idea with the student own words. • Represent the problems mathematically. • How to breakdown problems and analyze phenomena
(ii) Teaching strategies to be used to develop these 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 • 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
- Discussions of how to simplify or analyze some phenomena

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

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:
   - Giving bonus marks for attendance
   - 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.
4. 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. 12. 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) none
(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			
Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment

1	Midterm 1	5^{th} week	10
2	Midterm 2	10^{th} week	10
3	In-Class Problem Solving	13^{th},7^{th} week	10
4	project	12^{th} week	10
5	Homework	Every week	10
6	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) 8 office hours per week

E Learning Resources

1. Required Text(s) Given by teacher
2. Essential References
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) 1. C.Kittel / Introduction to Solid State Physics. 7th. dition 2. Walter A. Harrison/ Solid State Theory , Dover edition 1979
4-.Electronic Materials, Web Sites etc • http://www.phys.lsu.edu/~jarrell/COURSES/SOLID_STATE_HTML/course_solid.html • http://www.encyclopedia.com/topic/solid-state_physics.aspx • http://www.physics.byu.edu/research/condensed • http://web.utk.edu/~tbarnes/website/cm/cm.html • http://www.answers.com/topic/solid-state-physics
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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 • Laboratory for experimental solid state
2. Computing resources • Computer room • Scientific calculator.
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) Solid State Laboratory

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching 1. Midterm and final exam. 2. Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (a) Course report (b) Program report (c) Program self study ▪ 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) 1. The instructors of the course are checking together and put a unique process of

evaluation 2. Check marking of a sample of papers by others in the department. 3. Feedback evaluation of teaching from independent organization.
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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Title: Medical Physics

Course Code: 433391-3

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Clinical Radiotherapy Physics (PH433391-3)
2. Credit hours: - 3 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B. Sc Degree in Medical Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Forth year / Fifth level
6. Pre-requisites for this course (if any) Medical Radiation Physics (PH 431211-4)
7. Co-requisites for this course (if any) General Physics II (PH433102-4)
8. Location if not on main campus :- Within The University Campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The objectives of this course are to try to set down the basics of x-rays production and interaction with matter, biological effects of ionizing radiation, medical application of light, heat and cold applications in medicine and the electricity measurements of the human body
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) 26. Explain strategy of the course in the beginning of the semester 27. Outlines of the physical laws, principles and the associated proofs. 28. Highlighting the day life applications whenever exist. 29. Encourage the students to see more details in the international web sites and reference books in the library. 30. Cooperate with different institution to find how they deal with the subject 31. Renew the course references frequently 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 :-		
Topics	No of Weeks	Contact hours
1- Physics of heat and body	1	3 hrs
• Body as a heat source • Conduction and loss mechanisms of heat • Thermography • Medical application		
2- electricity within the body		

• Electricity of the nerve cell membrane • Nernest and Godlberg equation • Conduction of nerve cell • Electrophysiology of the heart • Charge propagation and distribution • Basics of electromyography • Basics of electrooculography • Basics of electroencephalography	3	9 hrs
3- Light in medicine		
• Basic principles of light [diffraction, reflection, absorption, etc] • Medical application of visible light • Medical application of Infrared light • Medical application of ultraviolet light • Medical Application of laser • Endoscopes and their application • Optics and physiology of the human eye	2	6 hrs
4- X-ray in medicine		
• X-ray tube components • Methods of X-ray productions • Calculation of attenuation of x-ray in biological tissues • Interactions methods od x-rays with biological tissues • Introduction to the application of x-rays in medicine	3	9 hrs
5- Introduction to Radiation Protection in medicine		
• Radiation protection goals • Calculation of shielding thickness • Radiation protection units [exposure, absorbed dose, source activity, equivalent dose. correlation]	2	6 hrs
6- biological effects of ionizing radiation		
• Direct and indirect effect • Factors affect cell radiosensitivity • Stochastic and non-stochastic effects • Acute and chronic syndrome • Factors affect the cell death	2	6 hrs

2 Course components (total contact hours per semester):

Lecture: 26 hr	Tutorial: 13hr	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

(xxviii)knowledge that students should know and understand when they complete the course are as follow:

1. Understanding different principles of medical physics
2. Learning experimental and theoretical knowledge of medical physics
3. Understanding the electricity within the human body
4. Learning the biological effects of ionizing radiation and radiation protection principles.

5. Teaching strategies to be used to develop that knowledge

46. Demonstrating the basic information and principles through lectures and the achieved applications
47. Discussing phenomena with illustrating pictures and diagrams
48. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
49. Tutorials
50. Revisit concepts

51. Discussions
52. Brain storming sessions
53. Start each chapter by general idea and the benefit of it;
54. Learn the student background of the subject;
55. Show the best ways to deal with problem;
56. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

22. Solve some example during the lecture.
23. Exams:
    a) Quizzes
    b) Short exams (mid term exams)
    c) Long exams (final)
    d) Oral exams
24. Discussions with the students.
25. Ask the student to clear the misunderstanding of some physical principle.

Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

21. How to use physical laws and principles to understand the subject
22. How to simplify problems and analyze phenomena
23. Analyse and explain natural phenomena.
24. Ability to explain the idea with the student own words.

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

27. Preparing main outlines for teaching
28. Following some proofs
29. Define duties for each chapter
30. Home work assignments
31. Encourage the student to look for the information in different references

Ask the student to do small research.

(iii) Methods of assessment of students cognitive skills

14. Midterm's exam. Exams, short quizzes
15. Asking about lecture previously taught
16. Writing reports on selected parts of the course
17. Discussions of how to simplify or analyse radiotherapy treatment plan

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

21. Learn how to search the internet and use the library.
22. Learn how to cover missed lectures.
23. Learn how to summarize lectures or to collect materials of the course.
24. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.

- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.
  - give students tasks of duties

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

18. Quizzes on the previous lecture
19. Checking report on internet use and trips
20. Discussion
21. The accuracy of the result gained by each group will indicate good group work

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.

14. Using internet to search for topics and writing reports
15. Using some math program for some calculation

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

45. Know the basic physical principles.

46. Use the web for research.
47. Discuss with the student.
48. Exams to measure the information skill.
49. Clear the weakness point that should be eliminated.
50. Encourage the student to ask for help if needed.
51. Data representation.

Display the lecture note and homework assignment at the web.

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

22. Their interaction with the lectures and discussions.
23. The reports of different asked tasks.
24. Homework, Problem solutions assignment and exam should focus on the understanding.
25. Results of computations and analysis.
26. 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 Semeste

Assess ment	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	Project	12th 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) 4 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- Physics in Biology and Medicine, Paul Davidovits, 3rd edition, Academic Press is an imprint of Elsevier 2007. 2- Handbook of physics in medicine and biology, Robert Splinter, CRC Press Taylor & Francis Group, 2010. 3- Biophysics, Roland Glaser, spring-Verlag Berlin Heidelberg, New York, 5th, 2001.
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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
2. Computing resources - Computer room
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- Midterm and final exam. 2- Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (m) Course report (n) Program report (o) Program self study ▪ 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. **Feedback evaluation of teaching from independent organization.**
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. 14- The following points may help to get the course effectiveness ▪ Student evaluation ▪ Course report ▪ Program report ▪ Program Self study 15- According to point 1 the plan of improvement should be given. 16- Contact the college to evaluate the course and the benefit it add to other courses. Add some subject and cut off others depending on the new discoveries in physics.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Name: Laser in Medicine

Course Code: 433333-3

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Laser in Medicine (PH 433333-3)
2. Credit hours: - 3 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B. Sc Degree in Medical Physics
4. Name of faculty member responsible for the course: Dr. Ramadan Ali Hassan
5. Level/year at which this course is offered: Third year
6. Pre-requisites for this course (if any) Optics (PH 433231-4)
7. Co-requisites for this course (if any) PH102 and Math 102
8. Location if not on main campus :- Within The University Campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The objectives of this course are to try to set down the basics of laser and its interaction with tissue and describe how these basics have been applied in some of the medical specialties.
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) 32. Explain strategy of the course in the beginning of the semester 33. Outlines of the physical laws, principles and the associated proofs. 34. Highlighting the day life applications whenever exist. 35. Encourage the students to see more details in the international web sites and reference books in the library. 36. Cooperate with different institution to find how they deal with the subject 37. Renew the course references frequently 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 :-		
Topics	No of Weeks	Contact hours
Laser Principles	1 Week	1.5 hr
Theory of temporal and spatial coherence		
Coherence Length and Spectral Line Width		
The optical properties of Laser beam	1 Week	
Electromagnetic Modes in a Cavity		
Theory of Laser Emission		

Major Types of Lasers	1 Week	
Measuring Laser Power and Focusing Laser Energy		1.5 hr
Basics of Fiber Optics		1.5 hr
Optical and Thermal Response of Tissue to Laser Radiation	1 Week	1.5 hr
The Optical Response Of Tissue		
Thermal Response Of Tissue	1 Week	
Interaction of Laser Light With Living Systems		
Dosimetry and Thermal Monitoring	1 Week	3 hr
Therapeutic and Diagnostic Application of Lasers in Ophthalmology	1 Week	
Basic Ocular Anatomy and Physiology and Transmission and Absorptive Properties of Ocular Tissues		1.5 hr
Photothermal Laser Applications	1 Week	1.5 hr
Photodisruptive Laser Applications		
Photochemical Laser Applications: Photoablation and Photodynamic Therapy	1 Week	
Laser in dermatology		1. 5 hr
Diagnostic Laser Applications	1 Week	
Tissue Diagnostics Using Lasers		1.5 hr

Spectroscopic Diagnostics of Malignant Tumours	1 Week	1.5 hr
Spectroscopic Diagnostics of Atherosclerotic Plaque	1 Week	1.5 hr
Light Scattering and Tissue Transillumination	1 Week	1.5 hr
Laser Safety		1.5 hr
Future of Medical Lasers and Fiber Optics	1 Week	

2 Course components (total contact hours per semester):			
Lecture: 26 hr	Tutorial: 13 hr	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

(xxix) knowledge that students should know and understand when they complete the course are as follow:

1. Understanding the physics of laser
2. Learning fundamentals of laser generation theory
3. Understanding the interaction of laser with tissues.
4. Learning laser applications in medicine.

5. Teaching strategies to be used to develop that knowledge

57. Demonstrating the basic information and principles through lectures and the achieved applications
58. Discussing phenomena with illustrating pictures and diagrams
59. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
60. Tutorials
61. Revisit concepts
62. Discussions
63. Brain storming sessions
64. Start each chapter by general idea and the benefit of it;
65. Learn the student background of the subject;
66. Show the best ways to deal with problem;
67. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

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

Ask quality question.

b. Cognitive Skills
(i) Cognitive skills to be developed 25. How to use physical laws and principles to understand the subject 26. How to simplify problems and analyze phenomena 27. Analyse and explain natural phenomena. 28. Ability to explain the idea with the student own words.
(ii) Teaching strategies to be used to develop these cognitive skills 32. Preparing main outlines for teaching 33. Following some proofs 34. Define duties for each chapter 35. Home work assignments 36. Encourage the student to look for the information in different references Ask the student to do small research.
(iii) Methods of assessment of students cognitive skills 18. Midterm's exam. Exams, short quizzes 19. Asking about lecture previously taught 20. Writing reports on selected parts of the course 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 - Work independently. The students learn independently and take up responsibility.

(ii) Teaching strategies to be used to develop these skills and abilities
25. Learn how to search the internet and use the library.
26. Learn how to cover missed lectures.
27. Learn how to summarize lectures or to collect materials of the course.
28. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.
- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.

give students tasks of duties

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

22. Quizzes on the previous lecture
23. Checking report on internet use and trips
24. Discussion
25. The accuracy of the result gained by each group will indicate good group work

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.

16. Using internet to search for topics and writing reports
17. Using some math program for some calculation

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

52. Know the basic physical principles.
53. Use the web for research.
54. Discuss with the student.
55. Exams to measure the information skill.
56. Clear the weakness point that should be eliminated.
57. Encourage the student to ask for help if needed.
58. Data representation.

Display the lecture note and homework assignment at the web.

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

27. Their interaction with the lectures and discussions.
28. The reports of different asked tasks.
29. Homework, Problem solutions assignment and exam should focus on the

understanding. 30. Results of computations and analysis. 31. 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			
Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessmen t
1	Midterm 1	5th week	10
2	Midterm 2	10th week	10
3	In-Class Problem Solving	13th,7th week	10
4	Project	12th week	10
5	Homework	Every week	10
6	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) 4 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- lasers in medicine by Ronald W. Waynant 2001 2- Medical applications of lasers D. R. Vij,K. Mahesh 2002 3- Introduction to Health Physics Herman Cember McGraw-Hill 2009
4-.Electronic Materials, Web Sites etc http://emedicine.medscape.com/article/838099-overview http://www.lasersinmedicine.com.au/index.html http://www.wickedlasers.com/laser-tech/medical_application.html
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.) - Lecture room for 30 students
2. Computing resources - Computer room
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 3- Midterm and final exam. 4- Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (p) Course report (q) Program report (r) Program self study ▪ 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. **Feedback evaluation of teaching from independent organization.**
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. 17- The following points may help to get the course effectiveness ▪ Student evaluation ▪ Course report ▪ Program report ▪ Program Self study 18- According to point 1 the plan of improvement should be given. 19- Contact the college to evaluate the course and the benefit it add to other courses. Add some subject and cut off others depending on the new discoveries in physics.

Level Six

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Title: Medical Radiation Physics
Course Code: 433364-4

Course Specification

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

Institution Umm AL Quraa University
College/Department : Physics department

A Course Identification and General Information

1. Course title and code: **Medical Radiation physics, 433364-4**
2. Credit hours : 3 Cr Hrs
3. Program(s) in which the course is offered. For medical physics students (If general elective available in many programs indicate this rather than list programs) **B.Sc Degree in Medical Physics**
4. Name of faculty member responsible for the course
5. Level/year at which this course is offered **Sixth Level / Third Year**
6. Pre-requisites for this course (if any) Pre-Requisite PH 433361-3
7. Co-requisites for this course (if any) : **Radiation physics**
8. Location if not on main campus Within The University Campus

B Objectives

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

The objectives of this course are to tease out the laws of radiation physics from our everyday experience by specific examples of how radiation physics phenomena manifest themselves.

We want to be able:

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

1- understanding radiation protection Principles,
2- being familiar with radiation background, interaction of radiation with matter, radiation quantities and units, and biological effects of ionizing radiation
   The overall goal is to use the scientific method to come to understand the enormous variety of radiation physics phenomena in terms of a few relatively simple laws

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)

38. Explain strategy of the course in the beginning of the semester
39. Outlines of the introduction for radiation physical laws, principles and the associated proofs.
40. Highlighting the radiation experiments corresponding to a theoretical subject.
41. Encourage the students to see more details in the international web sites and reference books in the library.
42. Discussing some selected problems in each chapter.
43. Cooperate with different institution to find how they deal with the subject
44. Renew the course references frequently

8- Development ofl radiation physics laboratory
9- Joining between the theoretical and industrial applications

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)

Topic	No of Week	Contact hours
Fundamental Sciences Quantities and units in science and engineering Background information Excitation and Ionization Characteristic x-ray Binding Energy The chart of nuclides	2	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	3	9 hrs

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	2	6 hrs
Radiation quantities and units Exposure Absorbed dose and equivalent dose Radioactivity	2	6 hrs
Biological Effects of Ionizing Radiation Nonstochastic Effects Death from whole body exposure The Acute Radiation Syndrome Damage to skin Stochastic effect	2	6 hrs
Radiation Protection in Medicine Radiation protection goals Radiation protection in medical imaging technology Radiation protection in nuclear medicine Radiation protection in radiotherapy	2	6 hrs

2 Course components (total contact hours per semester):			
Lecture: : 26 hrs	Tutorial: 13 hrs	Practical/Fieldwork/Internship:	Office hours

		39 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)

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

(xxx) Understanding the physics of radiation and their applications mentioned in the text.

(xxxi) Improving logical thinking.

(xxxii) To use mathematical formulation to describe the physical principle or phenomena

(xxxiii) Ability to explain how things work.

(i) Description of the knowledge to be acquired

Basic of radiation

Visit for radiology departments

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

68. Demonstrating the basic information and principles through lectures and the achieved applications
69. Discussing phenomena with illustrating pictures and diagrams

70. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
71. Tutorials
72. Revisit concepts
73. Discussions
74. Brain storming sessions
75. Start each chapter by general idea and the benefit of it;
76. Learn the student background of the subject;
77. Show the best ways to deal with problem;
78. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

30. Exams**:**
   a) Quizzes
   b) Short exams (mid term exams)
   c) Long exams (final)
   d) Oral exams
31. Discussions with the students.
32. Ask the student to clear the misunderstanding of some physical principle.

Ask quality question

b. Cognitive Skills

(i) Cognitive skills to be developed

29. How to use physical laws and principles to understand the subject
30. How to simplify problems and analyze phenomena
31. Analyse and explain natural phenomena.
32. Ability to explain the idea with the student own words.
33. Represent the problems mathematically.

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

37. Preparing main outlines for teaching
38. Following some proofs
39. Define duties for each chapter
40. Home work assignments

41. Encourage the student to look for the information in different references 42. 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 21. Midterm's exam. Exams, short quizzes 22. Asking about physical laws previously taught 23. Writing reports on selected parts of the course Discussions of how to simplify or analyze some phenomena
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
 	
29. Learn how to cover missed lectures.
30. Learn how to summarize lectures or to collect materials of the course.
31. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
32. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.
- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.
 	
  - give students tasks of duties

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility 26. Checking report on internet use and trips 27. Discussion 28. The accuracy of the result gained by each group will indicate good group work Presenting the required research on time and the degree of the quality will show the

sense of responsibility. 29. Quizzes on the previous lecture 30. Checking report on internet use and trips 31. Discussion 32. The accuracy of the result gained by each group will indicate good group work 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. 18. Computation 19. Problem solving 20. Data analysis and interpretation. Feeling physical reality of results
(ii) Teaching strategies to be used to develop these skills 59. Know the basic mathematical principles. 60. Use the web for research. 61. Discuss with the student. 62. Exams to measure the mathematical skill. 63. Clear the weakness point that should be eliminated. 64. Encourage the student to ask for help if needed. 65. Computational analysis. 66. Data representation. 67. Focusing on some real results and its physical meaning. 68. Lectures for problem solution. 69. 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

32. Their interaction with the lectures and discussions.
33. The reports of different asked tasks.
34. Homework, Problem solutions assignment and exam should focus on the understanding.
35. Results of computations and analysis.
36. 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

1. Problem solving
2. 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.
12. Display the lecture note and homework assignment at the web

(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	Midterm 1	5th week	10
2	Midterm 2	10th week	10
3	In-Class Problem Solving & Homework	13th,7th week	10
4	Medical Radiation laboratory	12th week	20
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) 4 office hours per week

E Learning Resources

1. Required Text(s)
2. Essential References

• 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.
Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)
4-.Electronic Materials, Web Sites etc - http://www.IAEA.com http://ICRP.com http://NCRP..com http://ICRU.com http://UNSCAR.com http://ANSI.com http://FWO.com http://WHO.com
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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 20 students - Library

Laboratory for medical radiation physics (there is a special course for laboratory related to medical radiation physics)
2. Computing resources - Computer room 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 - Midterm and final exam. Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (s) Course report (t) Program report (u) Program self study - 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. **Feedback evaluation of teaching from independent organization.**

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. 20- The following points may help to get the course effectiveness ▪ Student evaluation ▪ Course report ▪ Program report ▪ Program Self study 21- According to point 1 the plan of improvement should be given. 22- Contact the college to evaluate the course and the benefit it add to other courses. Add some subject and cut off others depending on the new discoveries in physics.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

COMPUTER 403383

Course Specification

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

A Course Identification and General Information

1. Course title and code: COMPUTER 403383-2
2. Credit hours: 2 Cr
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) :physics students
4. Name of faculty member responsible for the course : Dr. LOULOU Mehrez
5. Level/year at which this course is offered: 6^{th} level/ third year
6. Pre-requisites for this course (if any): 102 PH +140 Math
7. Co-requisites for this course (if any):no- Co-requisite
8. Location if not on main campus :on campus

B Objectives

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

The basic of computer and languages are taught in this course. Introduction to computers, languages, Virus, physical application , Microsoft Windows, Microsoft Arabic Word, and plotting by computer are briefly covered. By the end of this course the student will be able to :

- Know the components of a computer system and its architecture
- Know the database applications
- Define programming, Programs
- Define network and multimedia components

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)

* This course is developed by using interactive lab work showing most of the course lab in form of simulation comparing the real measurements obtained in lab work with simulated measurements.

* Using the library to search on some topic 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		
List of Topics	No of Weeks	Contac thours
Introduction to computers + computers	2	4
Computer languages	3	6
Operating system in personal computers (DOS)	2	4
Virus	1	2
Flow charts	2	4
Physical application	1	2
Microsoft Windows 3.1 +Microsoft Arabic Word	3	6

2 Course components (total contact hours per semester):				
Lecture: 28	Tutorial: 7	Laboratory: 0	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)
2 hours/week for homework

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 computer and computer languages

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

- Continuous evaluation by several quizzes and exams plus homework.
- online videos

(iii) Methods of assessment of knowledge acquired

- Quizzes every other week, Mid-term exam, Final exam
- Discussions with the students

b. Cognitive Skills

(v) Description of cognitive skills to be developed

- Ability to think critically and analytically in computing
- Ability to interpret of oriented problems, whether graphically or algebraically using the computer program

(vi) 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

• Research projects • 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 • Students have the necessary skills to defend their point of view and/or proposed solution to any computational problem based on the acquired knowledge. • Students learn independently and take up responsibility • Students can complete all assignments in due time
(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
(vii) 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. • Using internet to search for topic and writing reports • Make simulation • Plotting by computers (origin)
(ii) Teaching strategies to be used to develop these skills • Use the web for research • Discuss with the student • 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

(viii) 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

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Homework Assignments	All along	10%
2	Participation + Quizzes	All along	10%
3	Mid-term exam 1	6th	20%
4	Mid-term exam 2	14th	20%
5	Final exam	17th	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. In addition, students can arrange appointments with the lecturer whenever suits them.

E Learning Resources

1. Required Text(s) ;
2. Essential References :   * Fortran 77 with scientific and engineering application. Dr. Awad Mansour,   * Windows 3.1 and MS-DOS 6.2 by Majdi Mohammed abou alaata
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)   • Windows 3.1 and MS-DOS 6.2 by Majdi Mohammed abou alaata   • Fortran 77 with scientific and engineering application. Dr. Awad Mansour
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 in the university.
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

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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Name: Biomechanics

Course Code: 433393-3

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: **Biomechanics**
2. Credit hours; **3 Cr. Hrs**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) **B.Sc Degree in Medical Physics**
4. Name of faculty member responsible for the course
5. Level/year at which this course is offered **Sixth level/Third year**
6. Pre-requisites for this course (if any) **Classical Mechanics-433241**
7. Co-requisites for this course (if any)
8. Location if not on main campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The objectives of this course are to give the students the basic knowledge about the Bio-mechanics. The benchmark statement of the main learning outcomes are as follows: 12. To understand basic Fundamentals of biomechanics: Physics of fluids motion in the human body, elasticity and materials strength, friction for the human body, static forced and both of translational and angular motion for the human body. 13. The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT) 14. To describe, in words, the ways in which various concepts of biomechanics come into play in particular situations. 15. To analyse ultrasound systems using a required basics 16. To understand behaviour of different biomechanics principles.
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) 45. Explain strategy of the course in the beginning of the semester 46. Outlines of the physical laws, principles and the associated proofs. 47. Highlighting the day life applications whenever exist. 48. Encourage the students to see more details in the international web sites and reference books in the library. 49. Discussing some selected problems in each chapter. 50. Cooperate with different institution to find how they deal with the subject 51. Renew the course references frequently 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

Topic	No of Weeks	Contact hours
Static Forces-Equilibrium and Stability- Equilibrium Considerations for the Human Body.	2	6 hrs
Stability of the Human Body under the Action of an External Force- Skeletal Muscles- Levers- The Elbow- The Hip-Limping Standing		
Tip-Toe on One Foot- Dynamic Aspects of Posture.	1	3 hrs
Friction- Standing at an Incline-Friction at the Hip Joint-Spine Fin of a Catfish- EXERCISES.		
Translational Motion- Vertical Jump- Effect of Gravity on the Vertical Jump-	2	3 hrs
Running High Jump- Range of a Projectile- Standing Broad Jump- Running Broad Jump (Long Jump)- Motion through Air- Energy Consumed in Physical Activity- EXERCISES		
Angular Motion- Forces on a Curved Path- A Runner on a Curved Track- Pendulum	2	3 hrs
Walking- Physical Pendulum- Speed of Walking and Running- Energy Expended in Running- Alternate Perspectives on Walking and Running- Carrying Loads-EXERCISES		
Elasticity and Strength of Materials-Longitudinal Stretch and Compression-A Spring.	2	6 hrs
Bone Fracture: Energy Considerations-Impulsive Forces-Fracture Due to a Fall: Impulsive Force Considerations-Airbags: Inflating Collision Protection Devices.		
Whiplash Injury- Falling from Great Height- Osteoarthritis	1	3 hrs

and Exercise.		
Insect Flight-Hovering Flight-Insect Wing Muscles-Power Required for Hovering-Kinetic Energy of Wings in Flight-Elasticity of Wings-EXERCISES		
Fluids-Force and Pressure in a Fluid-Pascal's Principle	1	3hrs
Hydrostatic Skeleton-Archimedes' Principle-Power Required to Remain Afloat-Buoyancy of Fish-Surface Tension-Soil Water		
Insect Locomotion on Water-Contraction of Muscles-Surfactants-EXERCISES	1	3hrs
The Motion of Fluids-Bernoulli's Equation-Viscosity and Poiseuille's Law-Turbulent Flow-Circulation of the Blood-Blood Pressure-Control of Blood Flow.		
Energetics of Blood Flow-Turbulence in the Blood-Arteriosclerosis and Blood Flow	1	3 hrs
Power Produced by the Heart-Measurement of Blood Pressure-EXERCISES		

2 Course components (total contact hours per semester):

Lecture:**26**	Tutorial: **13**	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

(xxxiv) Learning fundamental principles of biomechanics of bone, muscle, fluid motion, elasticity of the material and friction.

(xxxv) Understanding the different life phenomena

(xxxvi) Improving logical thinking.

(xxxvii) To use mathematical formulation to describe the physical principle or phenomena

(xxxviii) Ability to explain how things work.

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

79. Demonstrating the basic information and principles through lectures and the achieved applications
80. Discussing phenomena with illustrating pictures and diagrams
81. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
82. Tutorials
83. Revisit concepts
84. Discussions
85. Brain storming sessions
86. Start each chapter by general idea and the benefit of it;
87. Learn the student background of the subject;
88. Show the best ways to deal with problem;
89. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired 33. Solve some example during the lecture. **34.** Exams**:** a) Quizzes b) Short exams (mid term exams) c) Long exams (final) d) Oral exams 35. Discussions with the students. 36. Ask the student to clear the misunderstanding of some physical principle. 37. Ask quality question
b. Cognitive Skills
(i) Cognitive skills to be developed 34. How to use physical laws and principles to understand the subject 35. How to simplify problems and analyze phenomena 36. Analyse and explain natural phenomena. 37. Ability to explain the idea with the student own words. 38. Represent the problems mathematically
(ii) Teaching strategies to be used to develop these cognitive skills 43. Preparing main outlines for teaching 44. Following some proofs 45. Define duties for each chapter 46. Home work assignments 47. Encourage the student to look for the information in different references 48. 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 24. Midterm's exam. Exams, short quizzes 25. Asking about physical laws previously taught 26. Writing reports on selected parts of the course Discussions of how to simplify or analyze some phenomena
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

33. Learn how to search the internet and use the library.
34. Learn how to cover missed lectures.
35. Learn how to summarize lectures or to collect materials of the course.
36. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
37. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.

- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.

give students tasks of duties

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

33. Quizzes on the previous lecture
34. Checking report on internet use and trips
35. Discussion
36. The accuracy of the result gained by each group will indicate good group work

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.

21. Computation
22. Problem solving
23. Data analysis and interpretation.

Feeling physical reality of results

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

70. Know the basic mathematical principles.
71. Use the web for research.

72. Discuss with the student.
73. Exams to measure the mathematical skill.
74. Clear the weakness point that should be eliminated.
75. Encourage the student to ask for help if needed.
76. Computational analysis.
77. Data representation.
78. Focusing on some real results and its physical meaning.
79. Lectures for problem solution.
80. 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

37. Their interaction with the lectures and discussions.

38. The reports of different asked tasks.

39. Homework, Problem solutions assignment and exam should focus on the understanding.

40. Results of computations and analysis.

41. Comments on some resulting numbers.

e. Psychomotor Skills (if applicable) **Frequently not permitted to be existed in practical colleges.**

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

- **Student are emphasizing to search through the internet about all concepts that they are learned on class.**

Student are emphasizing to look for the concepts that they are learned on class on library by themselves.

(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			
Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5th week	10
2	Midterm 2	10th week	10
3	In-Class Problem Solving	13th ,7th week	10
4	Project	12th week	10
5	Homework	Every week	10
6	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)
4 office hours per week

E Learning Resources

1. Required Text(s)
2. Essential References
[1] Physics in Biology and Medicine, Paul Davidovits, 3rd edition, Academic Press is an imprint

of Elsevier 2007. [2] Handbook of physics in medicine and biology, Robert Splinter, CRC Press Taylor & Francis Group, 2010. [3] Biophysics, Roland Glaser, spring-Verlag Berlin Heidelberg, New York, 5th, 2001.
Electronic Materials, Web Sites etc https://www.youtube.com/watch?v=YA_I2OvfM2I https://www.youtube.com/watch?v=bC8v6hlXnSk
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)
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.) • Lecture room for 30 students • Library Laboratory for electricity (there is a special course for laboratory related to Biomechanics course)
2. Computing resources • Computer room • 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 - Midterm and final exam. - Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (v) Course report (w) Program report (x) Program self study - 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. - Feedback evaluation of teaching from independent organization.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. 23- The following points may help to get the course effectiveness ▪ Student evaluation ▪ Course report ▪ Program report ▪ Program Self study 24- According to point 1 the plan of improvement should be given. 25- Contact the college to evaluate the course and the benefit it add to other courses. Add some subject and cut off others depending on the new discoveries in physics.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Nuclear I 403361

Course Specification

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

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

A Course Identification and General Information

1. Course title and code: Nuclear I (PH 361)
2. Credit hours: - 4 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Third year
6. Pre-requisites for this course (if any) PH 253+ PH344
7. Co-requisites for this course (if any) PH462 + PH461
8. Location if not on main campus :- Within The University Campus

B Objectives

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

The objective of this course is to establish the meaning of the ends of the computational and use in communication, and differentiation, integration and applications of it.

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

We want to be able:

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

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

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

1. Explain strategy of the course in the beginning of the semester
2. Outlines of the Nuclear concepts, theories and the associated proofs.
3. Highlighting the day life applications whenever exist.
4. Encourage the students to see more details in the international web sites and reference books in the library.
5. Discussing some selected problems in each chapter.
6. Cooperate with different institution to find how they deal with the subject
7. Renew the course references frequently
8. 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 :-		
Topics	No of Weeks	Contact hours
1- Nuclear Properties		
1- Definitions & Nuclear radii	1	1
2- Nuclear Mass-Binding Energy		1
3- Nuclear Radiation, Energy.		2
4- Levels, nuclear Isomers.	1	2
5- Angular Momentum, Parity and Symmetry		1
6- Dipole moment, qudropole moment		1
2- Liquid Drop Model		
1- Finding Energy	1	2
2- Sem-emperical Formula		2
3- Mass Spectrometer	0.5	1
4- Nuclear Reactions and Q-value		1
3- Nuclear Shell Model		
1- Single Particle model with square well and Harmovia Oscellator	1	1
2- Magic Numbers		2
3- Spin for Different nuclei		1
4- Excited rootes	1	1
5- Nuclear Magnetic momans		2
6- Parity and Isotopic Spin		1

4- Gamma Transitions		
1- Multiple Moments	1	2
2- Decay Constants		1
3- Selection Nucles		1
4- Angular Correlation	1	2
5- Internal Conversion		2
5- Alpha Transitions		
1- Heavy Ions-Stalitlity	0.5	1
2- Decay Constants		1
3- Tunnel Effect	1	2
4- Energy Levels		2
6- Beta Transitions		
1- Theorgy of B-decay	1	2
2- Allowed and Forbiddin transitions		2
3- Selection Nucles	1	2
4- Non Conservation of Parity		2
7- Elementary Particles		
1- Nucler Force and Meson Theory	1	2
2- Pions & Meuns		2
3- Kayons & Hyperons	1	2
4- Classi Fiction of demeray Pancles		2

2 Course components (total contact hours per semester):			
Lecture: 52 hr	Tutorial: 30 hr	Practical/Fieldwork /Internship:	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

(i) knowledge that students should know and understand when they complete the course are as follow:

- Learning fundamentals in nuclear physics.
- Understanding the models and theories which explain the nuclear properties.
- Improving logical thinking.
- To use concepts of nuclear physical in daily life.
- Ability to describe the nuclear phenomena.

(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 problem;
11. Keep the question "why" or "how" to explain always there;
12. Build a strategy to solve problem.

(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 mathematical principle.
5. Ask quality question.

b. Cognitive Skills

(i) 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. Ability to explain the idea with the student own words.
5. Represent the problems mathematically.

(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
7. 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 analyze some phenomena

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

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.

- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.
  - 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.
4. Feeling physical reality of results

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

1. Know the basic physical principles.
2. Use the web for research.
3. Discuss with the student.
4. Exams to measure the physical 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.
12. 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
(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

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5^{th} week	15
2	Midterm 2	10^{th} week	15
3	In-Class Problem Solving	13^{th},7^{th} 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)

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] Introductory Nuclear Physics, Krene, 1987.
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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.) 1. Lecture room for 30 students 2. Library
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. Midterm and final exam. 2. Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (a) Course report (b) Program report (c) Program self study ▪ 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) 1. The instructors of the course are checking together and put a unique process of evaluation 2. Check marking of a sample of papers by others in the department.

3. Feedback evaluation of teaching from independent organization.
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. Add some subject and cut off others depending on the new discoveries in physics.

Level Seven

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Title: Radiotherapy Physics

Course Code: 403490-4

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Radiotherapy Physics (PH433490-4)
2. Credit hours: - 4 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B. Sc Degree in Medical Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Forth year / Seventh level
6. Pre-requisites for this course (if any) Medical Radiation Physics (PH 433364-4)
7. Co-requisites for this course (if any) Atomic Physics (PH433253-3)
8. Location if not on main campus :- Within The University Campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The objectives of this course are to try to set down the basics of Radiation and its interaction with tissue and describe how these basics have been applied in Radiotherapy specialties.
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) 52. Explain strategy of the course in the beginning of the semester 53. Outlines of the physical laws, principles and the associated proofs. 54. Highlighting the day life applications whenever exist. 55. Encourage the students to see more details in the international web sites and reference books in the library. 56. Cooperate with different institution to find how they deal with the subject 57. Renew the course references frequently 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 :-		
Topics	No of Weeks	Contact hours
1- Basic radiation physics and dosimetric quantities and units		
• Ionization, radioactivity, different types of ionizing radiation, types of nuclear transformation, calculation of activity. • Basic components of x-ray machine. X-ray production and absorption methods • Exposure, absorbed dose, equivalent dose, effective dose, cumulative dose, permissible limits of exposure	1	3 hrs
2- Teletherapy Machines		

• Superficial, deep x-ray and supervoltage therapy machines [construction, operation, usage, advantages, disadvantages] • Cobalt-60 teletherapy machine [construction, operation, usage, advantages, disadvantages] • Microtron and Cyclotron [construction, operation, usage, advantages, disadvantages] • Linear accelerator [construction, operation, modes, types, usage, advantages, disadvantages]	3	9 hrs
3- Percentage Depth Dose Measurements		
• Tissue equivalent material [composition, calculation of equivalent density] • Types of phantoms • Percentage depth dose curves • Absolute dose to air and medium. [Kerma and absorbed dose] • Isodose distribution • Factors affect percentage depth dose [energy, field size, source-to-skin distance, bolus, wedges, depth]	2	6 hrs
4- Dosimetric Quantities		
• Backscatter factor [definition, calculation, dependent factors of variation, relation with percent depth dose] • Tissue-air ratio factor [definition, calculation, dependent factors of variation, relation with percent depth dose] • Tissue-maximum ratio [definition, calculation, dependent factors of variation, relation with percent depth dose] • Tissue-phantom ratio [definition, calculation, dependent factors of variation, relation with percent depth dose] • Scatter-air ratio [definition, calculation, dependent factors of variation]	3	9 hrs
5- Dose Calculation		
• Manual treatment planning (single field, multiple field, isocentric fields, surface irregularity, inhomogeneity correction, weighting, calculation of treatment time and given dose) • Treatment panning system requirements [beam data entry, patient data entry, algorithm, calculation, optimization, output data]	2	6 hrs
6- Basic principles of Brachytherapy		
• Types and properties of sealed radioactive sources • Different techniques of source implantation • Dose calculation	2	6 hrs

2 Course components (total contact hours per semester):			
Lecture: 26 hr	Tutorial: 13hr	Practical/Fieldwork /Internship: 39 hrs	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

(xxxix)knowledge that students should know and understand when they complete the course are as follow:

6. Understanding the physics of radiation therapy
7. Learning experimental and theoretical knowledge of radiation therapy physics
8. Understanding the Teletherapy Machines
9. Learning Brachytherapy physics.

10. Teaching strategies to be used to develop that knowledge

90. Demonstrating the basic information and principles through lectures and the achieved applications
91. Discussing phenomena with illustrating pictures and diagrams
92. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning

93. Tutorials 94. Revisit concepts 95. Discussions 96. Brain storming sessions 97. Start each chapter by general idea and the benefit of it; 98. Learn the student background of the subject; 99. Show the best ways to deal with problem; 100. Keep the question "why" or "how" to explain always there; Build a strategy to solve problem.
(iii) Methods of assessment of knowledge acquired 38. Solve some example during the lecture. **39.** Exams**:** a) Quizzes b) Short exams (mid term exams) c) Long exams (final) d) Oral exams 40. Discussions with the students. 41. Ask the student to clear the misunderstanding of some physical principle. Ask quality question.
b. Cognitive Skills
(i) Cognitive skills to be developed 39. How to use physical laws and principles to understand the subject 40. How to simplify problems and analyze phenomena 41. Analyse and explain natural phenomena. 42. Ability to explain the idea with the student own words.
(ii) Teaching strategies to be used to develop these cognitive skills **49.** Preparing main outlines for teaching **50.** Following some proofs **51.** Define duties for each chapter **52.** Home work assignments **53.** Encourage the student to look for the information in different references Ask the student to do small research.
(iii) Methods of assessment of students cognitive skills

27. Midterm's exam. Exams, short quizzes
28. Asking about lecture previously taught
29. Writing reports on selected parts of the course
30. Discussions of how to simplify or analyse radiotherapy treatment plan

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

38. Learn how to search the internet and use the library.
39. Learn how to cover missed lectures.
40. Learn how to summarize lectures or to collect materials of the course.
41. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.

- Encourage the student to attend lectures regularly by:
    - Giving bonus marks for attendance
    - Assigning marks for attendance.
    - give students tasks of duties

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

37. Quizzes on the previous lecture
38. Checking report on internet use and trips
39. Discussion
40. The accuracy of the result gained by each group will indicate good group work

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.

24. Using internet to search for topics and writing reports
25. Using some math program for some calculation

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

81. Know the basic physical principles.

82. Use the web for research.
83. Discuss with the student.
84. Exams to measure the information skill.
85. Clear the weakness point that should be eliminated.
86. Encourage the student to ask for help if needed.
87. Data representation.

Display the lecture note and homework assignment at the web.

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

42. Their interaction with the lectures and discussions.
43. The reports of different asked tasks.
44. Homework, Problem solutions assignment and exam should focus on the understanding.
45. Results of computations and analysis.
46. 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

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessmen t
1	Midterm 1	5th week	10
2	Midterm 2	10th week	10
3	Practical	12th week	20

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) 4 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- The physics of radiation therapy failz m. khan, ph.d. 2003 by lippincott williams & Wilkins 2- Clinical radiotherapy physics Lawrence Herman 2004 by Springer 3- Radiation oncology physics international atomic energy agency Vienna, 2005 4- Radiation oncology ;Physicist's eye view 2001 by Springer
4-.Electronic Materials, Web Sites etc http://www.oxfordradcliffe.nhs.uk/medphys/radiotherapy/home.aspx http://medicalphysicsweb.org/ http://www.aapm.org/links/medphys/
5- Other learning material such as computer-based programs/CD, professional standards/regulations

Wikipedia

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
2. Computing resources - Computer room
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 5- Midterm and final exam. 6- Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (y) Course report (z) Program report (aa) Program self study ▪ 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. **Feedback evaluation of teaching from independent organization.**

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

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

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

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

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

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Title: Radioisotopes in Medicine

Course Code: 433494-3

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Radioisotope in Medicine (PH 433494-3)
2. Credit hours: - 3 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B.Sc Degree in Medical Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Seventh Level / Fourth Year
6. Pre-requisites for this course (if any) Pre-Requisite PH 433364-4
7. Co-requisites for this course (if any)
8. Location if not on main campus :- Within The University Campus

B Objectives

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

The objectives of this course are to tease out the ultrasound waves properties from our everyday experience by specific examples of how ultrasound waves used in medical application especially imaging.

We want to be able:

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

17. To understand basic Fundamentals of Radioisotope production and protection of their hazards: Physics of production, radiopharmaceuticals' properties, and dose calculations in different body organs.
18. The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)
19. To describe, in words, the ways in which various concepts of radioisotopes come into play in particular situations; to represent radioisotope generation and principles of different medical applications.
20. To study Gamma camera and whole body counter used in evaluation of body's content of different radioisotopes
21. To understanding behaviour of different radioisotopes in medical tests.

The overall goal is to study the physical characteristics of radioisotopes, generation methods and different medical applications as a medical imaging technique, in addition to the protection ways.

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)

58. Explain strategy of the course in the beginning of the semester
59. Outlines of the physical laws, principles and the associated proofs.
60. Highlighting the day life applications whenever exist.
61. Encourage the students to see more details in the international web sites and reference books in the library.
62. Discussing some selected problems in each chapter.
63. Cooperate with different institution to find how they deal with the subject
64. Renew the course references frequently

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)

Topics to be achieved		
Topics	No. Of Weeks	Contact hours
Production and Properties of Radioisotopes	**2**	**4 hrs**
1- Matter and Energy		
2- Atomic Structure		
3- Isotopes, isotones and isobars		
4- Types of Isotopes		
5- Application		
6-Radioactive emissions and their properties		
7- Radioactivity in practical Radiology		
Gamma Camera	**2**	**4 hrs**
1- Components of gamma camera and operation		
2- Resolution and Efficiency		
3- Types of collimators and efficiency		
Radioisotopes in clinical medicine:	**3**	**6 hrs**
1- Radioactivity materials		
2- Nuclear reactor and its construction		
3- Radioactive equilibrium		
4- Characteristics of Target material		
5- 24 hrs Thyroid upta7ke test		
6- Kidney function test		
7- **Blood volume test**		
8- Radioactive phosphorus		
Radiation Dosimetry:	**3**	**6 hrs**
1- Physical, biological and effective half lifes		
2- Dosimetry calculations		
3- Accumulated activity		
4- S-value		

5- self-dose, target and source organs		
Radiation Safety:	**3**	**6 hrs**
1- Rationale and dose limits		
2- Occupational exposure and exposure to general public		
3- Methods for limiting exposure and shielding		
4- Radiation protection in nuclear medicine		

2 Course components (total contact hours per semester):			
Lecture: 26 hrs	Tutorial:	Practical/Fieldwork/Internship: 39 hrs	Other: Office

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

(xl) knowledge that students should know and understand when they complete the course are as follow:

(xli) Learning fundamentals of radioisotopes' physics

(xlii) Understanding the design of radiopharmaceutical generators and their applications mentioned in the text.

(xliii) Improving logical thinking.

(xliv) To use mathematical formulation to describe the physical principle of different imaging modes

Ability to explain how things work.

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

101. Demonstrating the basic information and principles through lectures and the achieved applications
102. Discussing phenomena with illustrating pictures and diagrams
103. Lecturing method:
    a. Blackboard
    b. Power point
    c. e-learning
104. Tutorials
105. Revisit concepts
106. Discussions
107. Brain storming sessions
108. Start each chapter by general idea and the benefit of it;
109. Learn the student background of the subject;
110. Show the best ways to deal with problem;
111. Keep the question "why" or "how" to explain always there;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

42. Solve some example during the lecture.
43. Exams:
    a) Quizzes
    b) Short exams (mid term exams)
    c) Long exams (final)
    d) Oral exams
44. Discussions with the students.
45. Ask the student to clear the misunderstanding of some physical principle.

Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

43. How to use physical laws and principles to understand the subject
44. How to simplify problems and analyze phenomena

45. Analyse and explain natural phenomena.
46. Ability to explain the idea with the student own words.
47. Represent the problems mathematically.

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

54. Preparing main outlines for teaching
55. Following some proofs
56. Define duties for each chapter
57. Home work assignments
58. Encourage the student to look for the information in different references
59. 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

31. Midterm's exam. Exams, short quizzes
32. Asking about physical laws previously taught
33. Writing reports on selected parts of the course

Discussions of how to simplify or analyze some phenomena

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

42. Learn how to search the internet and use the library.
43. Learn how to cover missed lectures.
44. Learn how to summarize lectures or to collect materials of the course.
45. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
46. Develop her interest in Science through :(lab work, field trips, visits to

scientific and research.
- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.
 	
give students tasks of duties

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility 41. Quizzes on the previous lecture 42. Checking report on internet use and trips 43. Discussion 44. The accuracy of the result gained by each group will indicate good group work 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. 26. Computation 27. Problem solving 28. Data analysis and interpretation. Feeling physical reality of results
(ii) Teaching strategies to be used to develop these skills 88. Know the basic mathematical principles. 89. Use the web for research. 90. Discuss with the student. 91. Exams to measure the mathematical skill. 92. Clear the weakness point that should be eliminated. 93. Encourage the student to ask for help if needed. 94. Computational analysis. 95. Data representation. 96. Focusing on some real results and its physical meaning. 97. Lectures for problem solution.

98. 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 47. Their interaction with the lectures and discussions. 48. The reports of different asked tasks. 49. Homework, Problem solutions assignment and exam should focus on the understanding. 50. Results of computations and analysis. 51. Comments on some resulting numbers.
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	Midterm 1	5th week	10
2	Midterm 2	10th week	10
3	Practical	12th week	20
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) 4 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] Physics & Instrumentation of Nuclear Medicine by Sprawls
[2] Basic Science of Nuclear Medicine by Parker
4-.Electronic Materials, Web Sites etc
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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 - 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 - Midterm and final exam. - Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (bb) Course report (cc) Program report (dd) Program self study (ee) Fortification of the student learning. (ff) 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) - The instructors of the course are checking together and put a unique process of evaluation - Check marking of a sample of papers by others in the department. - Feedback evaluation of teaching from independent organization.
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

29- The following points may help to get the course effectiveness

- Student evaluation
- Course report
- Program report
- Program Self study

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

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

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

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

COURSE SPECIFICATION

Course Title: Medical imaging

Course Code: 433497-3

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 Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Medical Imaging (PH 433497-3)
2. Credit hours: - 3 Cr. Hrs
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) B. Sc Degree in Medical Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: Forth year
6. Pre-requisites for this course (if any) Medical Radiation Physics (PH 433364-4)
7. Co-requisites for this course (if any) Atomic Physics (PH 433253-3)
8. Location if not on main campus :- Within The University Campus

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course. The objectives of this course are to try to set down the basics of medical imaging and describe how these basics have been applied in some of the medical specialties.
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) 65. Explain strategy of the course in the beginning of the semester 66. Outlines of the physical laws, principles and the associated proofs. 67. Highlighting the day life applications whenever exist. 68. Encourage the students to see more details in the international web sites and reference books in the library. 69. Cooperate with different institution to find how they deal with the subject 70. Renew the course references frequently 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 :-

Topics	No of Weeks	Contact hours
1 **Introduction to digital image**		
processing Digital images Image quality Basic image operations	**2**	**6 hrs**
2 **Radiography**	**3**	**9 hrs**

Introduction X-rays Interaction with matter X-ray detectors Dual-energy imaging Image quality Equipment Clinical use Biologic effects and safety Future expectations		
3 **X-ray computed tomography**	**3**	**9 hrs**
Introduction X-ray detectors in CT Imaging Cardiac CT Dual-energy CT Image quality Equipment Clinical use Biologic effects and safety Future expectations		
4 **Magnetic resonance imaging**	**3**	**9 hrs**

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		
5 **Nuclear medicine imaging**	**2**	**6 hrs**
Introduction Radionuclides Interaction of γ-photons and particles with matter Data acquisition Imaging Image quality Equipment Clinical use		

2 Course components (total contact hours per semester):			
Lecture: 26 hr	Tutorial: 13 hr	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
(xlvi) knowledge that students should know and understand when they complete the course are as follow: 6. Understanding the physics of medical imaging 7. Learning fundamentals of clinical application of medical imaging 8. Understanding of factors effecting image quality. 9. Learning of medical imaging systems.
10. Teaching strategies to be used to develop that knowledge 112. Demonstrating the basic information and principles through lectures and the achieved applications 113. Discussing phenomena with illustrating pictures and diagrams 114. Lecturing method: a. Blackboard b. Power point c. e-learning 115. Tutorials 116. Revisit concepts 117. Discussions 118. Brain storming sessions 119. Start each chapter by general idea and the benefit of it; 120. Learn the student background of the subject; 121. Show the best ways to deal with problem; 122. Keep the question "why" or "how" to explain always there; Build a strategy to solve problem.
(iii) Methods of assessment of knowledge acquired 46. Solve some example during the lecture. **47.** Exams**:** a) Quizzes b) Short exams (mid term exams) c) Long exams (final) d) Oral exams

48. Discussions with the students.
49. Ask the student to clear the misunderstanding of some physical principle.

Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

48. How to use physical laws and principles to understand the subject
49. How to simplify problems and analyze phenomena
50. Analyse and explain natural phenomena.
51. Ability to explain the idea with the student own words.

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

60. Preparing main outlines for teaching
61. Following some proofs
62. Define duties for each chapter
63. Home work assignments
64. Encourage the student to look for the information in different references

Ask the student to do small research.

(iii) Methods of assessment of students cognitive skills

34. Midterm's exam. Exams, short quizzes
35. Asking about lecture previously taught
36. Writing reports on selected parts of the course

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

- Work independently.

The students learn independently and take up responsibility.

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

47. Learn how to search the internet and use the library.
48. Learn how to cover missed lectures.
49. Learn how to summarize lectures or to collect materials of the course.
50. Develop her interest in Science through :(lab work, field trips, visits to scientific and research.

- Encourage the student to attend lectures regularly by:
  - Giving bonus marks for attendance
  - Assigning marks for attendance.

give students tasks of duties

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

45. Quizzes on the previous lecture
46. Checking report on internet use and trips

47. Discussion
48. The accuracy of the result gained by each group will indicate good group work

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.

29. Using internet to search for topics and writing reports
30. Using some math program for some calculation

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

99. Know the basic physical principles.
100. Use the web for research.
101. Discuss with the student.
102. Exams to measure the information skill.
103. Clear the weakness point that should be eliminated.
104. Encourage the student to ask for help if needed.
105. Data representation.

Display the lecture note and homework assignment at the web.

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

52. Their interaction with the lectures and discussions.
53. The reports of different asked tasks.
54. Homework, Problem solutions assignment and exam should focus on the understanding.
55. Results of computations and analysis.
56. 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

Assess	Assessment task (eg. essay, test, group project,	Week due	Proportion

ment	examination etc.)		of Final Assessmen t
1	Midterm 1	5^{th} week	10
2	Midterm 2	10^{th} week	10
3	In-Class Problem Solving	13^{th},7^{th} week	10
4	project	12^{th} week	10
5	Homework	Every week	10
6	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) 4 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- Medical imaging physics Fourth Edition William R. Hendee, Ph.D. 2002 by Wiley-Liss, Inc 2- Fundamentals of Medical Imaging Second Edition Paul Suetens Cambridge University Press 2009 3- 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 Wikipedia

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
2. Computing resources - Computer room
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 7- Midterm and final exam. 8- Quiz.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (gg) Course report (hh) Program report (ii) Program self study ▪ 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) - The instructors of the course are checking together and put a unique process of evaluation

- Check marking of a sample of papers by others in the department.

Feedback evaluation of teaching from independent organization.

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

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

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

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

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

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Electronics 403423

Course Specification

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

Institution	Umm AL-Qura University
College/Department	College of Sciences / Physics Department

A Course Identification and General Information

1. Course title and code: Electronics PH423
2. Credit hours: 4 Cr Hours (3+Lab)
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) *B.Sc Degree in Physics*
4. Name of faculty member responsible for the course
5. Level/year at which this course is offered Fourth year
6. Pre-requisites for this course (if any) Pre-Requisite 246 PH + 285 PH
7. Co-requisites for this course (if any)
8. Location if not on main campus Within The University Campus

B Objectives

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

Outcomes of this course are to introduce the basic physical principles and fundamentals of semiconductors and their usage and applications in electronic components like diodes and transistors.

This course introduces basic principles of linear and digital electronic circuits that are used in the everyday experience, like

- Signal operational amplifiers,
- Circuit rectifiers.
- Digital circuits like logic gates
- Applications to memory chips and timers used in most of electronic devices

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

1. Understand and analyze relatively simple electronic layouts and circuits
2. Design special purpose circuits that meet his requirements in his scientific life

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. Explain strategy of the course in the beginning of the semester
2. Outlines of the physical laws, principles and the associated proofs.
3. Highlighting the day life applications whenever exist.
4. Encourage the students to see more details in the international web sites and reference books in the library.
5. Discussing some selected problems in each chapter.
6. Cooperate with different institution to find how they deal with the subject
7. Renew the course references frequently
8. 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

Topic	No of Weeks	Contacthours
I- CONDUCTION MECHANISM IN SEMICONDUCTORS 1. Metals and semiconductors; Carrier Concentration; Charge neutrality; Impurities 2. Carrier concentration at equilibrium ; Temperature dependence; Non-equilibrium and excess carriers 3. Recombination and generation of excess carriers 4. Transport of electric current; Drift diffusion and flow of carriers; Einstein relations	2 weeks	6 hrs
II- DISTRIBUTION AND FLOW OF CARRIERS IN SEMICONDUCTOR 1. The effect of recombination on flow 2. Evaluation of carrier lost bu recombination; Modified conservation law 3. Graded semiconductors and built-in-fields 4. Equilibrium situation and minority carrier flow	2 weeks	6 hrs

III- JUNCTION DIODE PHYSICAL ELECTRONICS 1. The p-n junction; physical model for p-n junction 2. Carrier concentration at edges of space-charge layer 3. Minority distribution and flow 4. Current-Voltage characteristics 5. Temperature dependence of idealized diode equation 6. Brief view of p-n dynamic behavior; junction structure; 7. Contacts and metal-semiconductor junctions	2 weeks	6 hrs
IV- BIPOLAR JUNCTION TRANSISTORS 1. BJT as control valves 2. Operation of BJT 3. Circuit models of low speed active region operation 4. An example of transistor circuit analysis ; Transistor operation at extremes of collector voltage	2 weeks	6 hrs
V- FIELD-EFFECT TRANSISTORS 1. Electrical properties of semiconductors for surfaces 2. Volt-Ampere characteristics of MOSFET 3. A brief view of dynamics for MOSFET and circuit applications 4. Junction Field-Effect Transistors static drain characteristics; 5. Comparison of MOSFET and FET transistors	2 weeks	6 hrs
VI- Operational amplifiers 1. Introduction 2. Connecting the Amplifier to the circuit 3. Ideal and real Amplifiers 4. Linear Amplification and negative feedback 5. Special applications of amplifications 6. Addition and subtraction of signals 7. Memory and timing applications; using positive feedback (Multivibrators) 8. Integration and Differentiation	2 weeks	6 hrs

VII- DIGITAL ELECTRONICS 1. Digital logic (Binary numbers, Logic levels, Logic gates; Truth tables; Logic families-practical circuits) 2. Main gates (AND, OR, NOT, NAND, NOR) 3. Combination of gates 4. Logic laws 5. XOR and XNOR gates 6. Adding of binary numbers 7. Memory elements (Multivibrators, Flip-Flops)	2 weeks	6 hrs

2 Course components (total contact hours per semester):			
Lecture: 42 hrs	Tutorial: 30 hrs	Practical/Fieldwork /Internship:	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
(i) Description of the knowledge to be acquired • Learning fundamentals in electronics and electronic elements

- Understanding the physics of electronics and their applications mentioned in the text.
- Improving logical thinking.
- Ability to understand and design simple electronic circuits
- Ability to explain how things work.

(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:
  - Blackboard
  - 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;
- Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

- Solve some example during the lecture.
- Exams**:**
  - Quizzes
  - Short exams (mid term exams)
  - Long exams (final)
  - Oral exams
- Discussions with the students.
- Ask the student to clear the misunderstanding of some physical principle.
- Ask quality question.

b. Cognitive Skills

(i) 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. Ability to explain the idea with the student own words. 5. Represent the problems mathematically.
(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. Homework assignments 5. Encourage the student to look for the information in different references 6. Ask the student to attend lectures for practice solving problem 7. Ask the student to do small research.
(iii) Methods of assessment of students cognitive skills 1. Midterm's exam;. 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
(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 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 his interest in Science through :(lab work, field trips, visits to scientific and research institutions. 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.
4. 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.
12. 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

(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

Assess ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5th week	10
2	Midterm 2	10th week	10
3	In-Class Problem Solving	13th,7th week	10
4	project	12th week	10
5	Homework	Every week	10
6	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)

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] **Physics by Experiment** , by J.R.L Hartley; D.L. Misell; Pob. Stanley Thornes
4-.Electronic Materials, Web Sites etc - http://www.physicsclassroom.com - http://www.electronicstheory.com/ - http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/
5- Other learning material such as computer-based programs/CD, professional standards/regulations Wikipedia

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.) 1. Lecture room for 30 students 2. Library 3. Laboratory for electronics there is a special course for laboratory related to electronics)
2. Computing resources • Computer room • Scientific calculator.

4. 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 • Midterms and final exam. • Quizzes.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching (a) Course report (b) Program report (c) Program self study ▪ 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) 1. The instructors of the course are checking together and put a unique process of evaluation 2. Check marking of a sample of papers by others in the department. 3. Feedback evaluation of teaching from independent organization.
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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Computer in Medicine 403483-1

Course Specifications

Institution: **Umm AL – Qura University**	Date: **17/4/1439**
College/Department: **College of Applied Science – Department of Physics**	

A. Course Identification and General Information

1. Course title: **Computing in Medicine** Course Code**: 403483-1**
2. Credit hours: **1 (1+0+0) Hr**
3. Program(s) in which the course is offered: **Bachelor of Science** (**B.Sc) Medical Physics** (If general elective available in many programs indicate this rather than list programs)
4. Course Language: **English**
5. Name of faculty member responsible for the course **Dr. Hosam Salaheldin Ibrahim**
6. Level/year at which this course is offered: **Level 6 / 3th Year**
7. Prerequisites for this course (if any):): **Computer (403383-1)**
8. Co-requisites for this course (if any): **NIL**
9. Location, if not on the main campus: **Main campus (Abdeia) and Alzaher campus**

10. Mode of Instruction (mark all that apply)

A. Traditional classroom	√	What percentage?	80%
B. Blended (traditional and online)	√	What percentage?	20%
C. E-learning		What percentage?	
D. Correspondence		What percentage?	
F. Other		What percentage?	

Comments: The mode of instruction is distributed and used two items [Traditional classroom with 80%, and 20%blended (traditional and online)]

B Objectives

1. What is the main purpose of this course? Computer software is used for diagnosis of diseases. It can be used for the examination of internal organs of the body. Advanced computer-based systems are used to examine delicate organs of the body. Some of the complex surgeries can be performed with the aid of computers. 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. **After completing this course student should recognize the followings:** 1. The use of Information & Communication Technologies (ICT) in medicine. 2. The improvement of the medical image quality using image processing software. 3. The modern application of computer in medical areas as a surgical tool.
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g., Increased use of IT or web based reference material, changes in content as a result of new research in the field) - The E-Learning system is being conducted. - Students should learn a programming language (e.g. Matlab package, visual C++, ….etc). - To carry out an assay, encourage the students to use different web search engines, writing software packages, statistical softwares....etc. - Interpersonal skills, relating to the ability to interact with other people and to engage in team-working through group discussion. - Problem solving skills, relating to qualitative and quantitative information.

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

Course Description:

1 Topics to be Covered		
Topics	**No of Weeks**	**Contact hours**
Computer Digital and Analog Basics **Storage and transfer of data between computer number systems** **Decimal form (Base 10)** **Binary form** **Conversions between decimal and binary forms**	**1**	**1**

Digital Representation of Data Bits, Bytes, and Words **Digital Representation of Different Types of Data** **Storage of Positive Integers** **Binary Representation of Signed Integers** **Analog Data And Conversion Between Analog and Digital Forms** **Advantages and Disadvantages of the Analog and Digital Forms** **Solved problems** **Quiz 1** **Quiz 2**	**2**	**2**
Computer in Imaging, Nuclear Medicine **Pulse-Height Analyzer** **Digital Image Formats in Nuclear Medicine** **Nuclear medicine, computers is used for:** • **The Data Acquisition,** • **Data Storage.** • **Processing of Data.** **Formation of digital images.**	**2**	**2**
Display, Conversion of a Digital Image into an Analog Video Signal. **Grayscale Cathode Ray Tube Monitors.** **Image Acquisition in Nuclear Medicine.** **Frame Mode (Static, dynamic, gated).** **List-mode acquisition.** **The advantage of list-mode acquisition.** **The disadvantage of list-mode acquisition.** **Solved problems.** **Quiz 1** **1st Class Test Exam**	**2**	**2**
Information & Communication Technologies (ICT) and medicine • **Patient records** • **Medical equipments** • **Research** • **Web-based diagnosis** • **Expert systems** • **Communications** • **Computers and the disabled**	**2**	**2**
Digital Image Processing **Function of Image Processing** **General Areas of Image Processing** **Clipping** • **Point Operations** • **Look-Up Table (LUT)** **Contrast Point Operation** **Image Processing in Nuclear Medicine** **Brightness of Image** **Image Contrast** **Image Contrast Differences**	**2**	**2**

Histograms **Image Histogram** **Region or ROI (region of interest)** **Image Histogram Operations** • **Histogram Stretching** • **Histogram Sliding** • **Histogram equalization** • **Other Histogram Information** **Local Operations** **Convolution ((kernel)** • **Low Pass Filter** • **High Pass Filter** **2nd Class Test Exam**	**2**	**2**
Smoothing Filters **Linear Smoothing Filters** **Mean Or Average Filter** **Gaussian Smoothed Filter** **Non-linear Smoothing Filters** **Median Filter** **Enhance Filters** • **Edge enhancement** • **Edge detection** • **Directional Edge Detection** • **Laplacian Edge Detection** • **Sobel Edge Detection** • **Prewitt Edge Detection**	**2**	**2**
	15 weeks	**15 hr**

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	**15**	**-**	**-**	**-**	**-**	**15**
Credit	**1**	**-**	**-**	**-**	**-**	**1**

3. Additional private study/learning hours expected of students per week.	**2**

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

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table).
Second, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes.
Third, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge** ***At the end of this course the student should be able to:***		
1.1	Define the basic knowledge of computer related to the medical signal and/or image processing.	- Classroom lectures - Tutorials and independent study assignments - Individually hand written assignments required use of library reference material and web sites to identify the information required to complete tasks. - E-learning through the university website.	- Graded homework. - Assignments. - Quizzes. - Oral Group Discussion. - Class tests (e.g. 15 minute multiple choice test on content on completion of each topic) with a defined ratio of the final assessment of the course. Multiple choice knowledge item on final exam
1.2	Outline the basic information & communication technologies (ICT) related to medicine.		
1.3	State various image quality enhancement techniques.		
1.4	Recognize how to improve and develop the medical signal and /or image related to essential different medical imaging (e.g. nuclear medicine, MRI, ophthalmic and US image processing).		
2.0	**Cognitive Skills** ***At the end of this course the student should be able to:***		
2.1	Summarize general areas of image processing.	- Explain and justify several unsolved examples and unsolved problems in lecture under the supervision of the instructor. - Encourage the	- Graded homework. - Class exams. - Final Exam. - Group and individual assignments require application of analytical tools
2.2	Compare between low pass filter and high pass filter.		
2.3	Differentiate between Clipping, Point		

	Operations and Look-Up Table (LUT).	students to analyze and enhance the medical images using certain image processing program packages (e.g. MATLAB, Image J software).	in problem solving tasks. - Class participation.
2.4	Design different codes using a programming language to locate and enhance the medical signal and/or image.		
2.5	Differentiate between different types of Histograms		
2.6	Explain linear smoothing filters and non-linear smoothing filters.		
2.7	Interpret the effect of edge detection different operators (e.g. Laplacian, Sobel and Prewitt) on the image details.		
3.0	**Interpersonal Skills & Responsibility** ***At the end of this course the student should be able to:***		
3.1	Work effectively in groups as well as individuals.	- Discuss with students. - Group presentation. - Group assignment (the instructor should meet with each group part way through project to discuss and advise on approach to the tasks). - Individual student assignment or report carries out using the internet and/or library as a source of search.	- Evaluation of group reports and individual contribution within the group. - Peer or self assessment. - Evaluation of the capacity for independent study which could be assessed in individual assignments.
3.2	Justify a short report in a written form and/or orally using appropriate scientific language.		
4.0	**Communication, Information Technology, Numerical** ***At the end of this course the student should be able to:***		
4.1	Illustrate information technology and modern computer tools to locate and retrieve scientific information relevant to computing in medicine.	- Essay questions - Group presentation - Encouraging assays, reports and presentations. - Encourage the student to use the modern Information and Communication	- Assessments of student's assignments. - Evaluation of group reports and individual contribution within the group. - Reports and presentations. - Instructor's feedback - Final and short exams include different problems which need numerical and technical skills.
4.2	Appraise the cooperation through teamwork to assess and criticize various emergent problems.		

4.3	Interpret the defined noise and artifacts an in the medical images to be improved using different signal and/or image processing package.	Technology (ICT) tools to prepare the required essays, reports, and/or projects. - Also, the students should conduct the ideal proper style and referencing format as specified in college style manual.	
5.0	**Psychomotor**		
5.1	Not applicable (N/A)	N/A	N/A

6. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	**Week Due**	**Proportion of Total Assessment**
1	Homework, quizzes, unsolved problems, oral presentation, class discussion and case study.	Weekly	10 %
2	1st Class test.	7th	15%
3	2nd Class test.	13th	15%
4	An essay (single and/or group project, and poster).	14th	10%
5	Final Exam.	16th-17th	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)

Each student will supervise by an academic adviser in physics Department and the time table for academic advice were given to the student each semester. (2 hrs per week)

E Learning Resources

1. List Required Textbooks

   1. Rachel A. Powsner, Edward R. Powsner, Essentials of Nuclear Medicine Physics and Instrumentation, A John Wiley & Sons, Ltd, 3rd Ed (2013).

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

1. Medical Image Analysis journal, Elsevier Science Ltd. https://www.journals.elsevier.com/medical-image-analysis/
3. List Recommended Textbooks and Reference Material (Journals, Reports, ……..etc.) 1. Paul Davidovits, Physics in Biology and Medicine, Elsevier Inc Ltd, 3rd Ed (2008).
4. List Electronic Materials, Web Sites, Facebook, Twitter, ………………………..etc.) • https://www.mathworks.com/products.html • https://imagej.net/Downloads • https://www.dartmouth.edu/~library/biomed/guides/research/medimages.html
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. **1. The Microsoft Office for editing reports.** **2. The Matlab and Image J software package to train the student about how making image processing.**

F. Facilities Required

Indicate requirements for the course, including the size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) There are enough classrooms provided with a good accommodation, including good air condition, good data show slide projector, and suitable white board.
2. Computing resources (AV, data show, Smart Board, software, etc.) In each lecture classroom and laboratory, there is a data show, and a suitable white board.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) **N/A**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching **Question to students on the course evaluation.** **Question to students on the exam evaluation.**
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department **Internal revisions by the staff members about the courses and examinations.** **Questionnaires to job owners in the graduate employer evaluation.**

3 Processes for Improvement of Teaching **Periodical revisions to the course specification, reports and evaluations of the instructor.** **Continuous training courses on teaching improvements for staff member** **Using scientific flash and movies.**
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) • **Efficiency of course will be reflected in the results of the class, which reviewed by members of the teaching staff in addition to other duties such as discussing ideas and ways of teaching and learning.** • **The course should be developed periodically to ensure that it contains the latest developments in the field of study.** • **Development could be put as an objective in the report of the course to be achieved each semester**
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. **Continuous observations of the following processes:** • **Statistical data feedback from questionnaires to students on the Instructor evaluation.** • **Internal revisions by the staff members about the courses and examinations.** • **Statistical data feedback from questionnaires to job owners in the graduate employer evaluation in order to improve the course according to the needs of the outer community.** • **Statistical data feedback from questionnaires to the student needs in order to improve the course according to the needs of the students.** • **Observation of the student results from examinations.**..

Name of Instructor: _______ ____________________
Signature: Date Report Completed:

Name of Field Experience Teaching Staff _____________________________________

Program Coordinator:
Signature: Date Received:

Level Eight

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

Practical Training 403499-6

Institution: **Umm AL – Qura University**	Date : **17/4/1439**
College/Department : **College of Applied Science – Department of Physics**	

A. Course Identification and General Information

1. Course title and code: **Training Project (Code: 403498-5)**
2. Credit hours: **6 Hrs**
3. Program(s) in which the course is offered. **B.Sc Medical Physics** (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course **Prof. Saud Allehyani**
5. Level/year at which this course is offered: **4rd Year / 8th Level**
6. Pre-requisites for this course (if any): **Department agreement**
7. Co-requisites for this course (if any): **NIL**
8. Location if not on main campus: **in the hospitals related to the training**
9. Mode of Instruction (mark all that apply)

Mode	Mark		Percentage
a. traditional classroom	✓	What percentage?	100%
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course?

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. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

1- To Perform quality control for X-ray machines.
2- Measure the entrance skin doses for patients during different X-ray imaging.

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

Course Description:
The course will cover the principle of different medical X-ray machines, diagnostic and radiotherapy machines.. This course will provide the essentials of different medical imaging practices..

1 Topics to be Covered

Topics	No of Weeks	Contact hours
Practicing on 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 and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	**900**	**-**	**-**	**-**	**-**	**900**
Credit	**6**	**-**	**-**	**-**	**-**	**6**

3. Additional private study/learning hours expected of students per week.	**12**

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

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table).
Second, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes.
Third, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
	. Understand the basic physical principles of different X-ray examinations. a2. List the tools required for each quality control examination/	1. Demonstrating the basic information and principles through medical training 2. Start each medical	• Report • Presentation • Discussion

	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.	training practice by general idea and the benefit of it. *3.* Brain storming sessions. *4.* Discussions. 5. Self learning	
2.0	**Cognitive Skills**		
	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.	▪ Using Cal-Dose program to calculate the entrance skin dose ▪ Group Discussion ▪ Encourage the student to look for the information in different references	▪ Seminars
3.0	**Interpersonal Skills & Responsibility**		
	c1. Summarize the different procedures of imaging. *c2-* justify the essential parts of different clinical situations and formulate a strategy for the optimum setup of each clinical situation.	▪ Cooperation with a lot of hospitals in makkah, Jeddah,Taif and Riyadh	*Assessment of group assignment includes component for individual contribution. Capacity for independent study assessed in individual assignments.* a) Report
4.0	**Communication, Information Technology, Numerical**		
	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	1. Group seminar discussion 2. Reports about different tasks	a) Report assignment

	writing a good report		
5.0	**Psychomotor**		
5.1	N/A	N/A	N/A

6. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Reports (reports/training program)	End of the training project	70 %
2	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)

Each student will supervise by academic adviser in physics Department and the time table for academic advice were given to the student each semester. (2 hrs per week)

E Learning Resources

1. List Required Textbooks

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

2- Essential Nuclear Medicine Physics. R.A.Powsner&E.R.Powsner, 1stEds, 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

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

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

1- Philip Mayles,Alan Nahum”handbook of radiotherapy physics:theory and practice” Taylor&Francis, **2007.**

2- Faiz.M.Khan "Treatment Planning in radiation Oncology" 3rd aedition,Lippincott Williams&Wilkins, **2011**.
3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. ▪ http://www.excelmedicalimaging.com/ ▪ http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=6159236 ▪ http://www.nema.org/prod/med/ • http://www.ennovations.co.uk/p/20/interactive-radiotherapy-planning-for-students-irps-version-401 • http://radonc.uams.edu/research/medical-physics-research/dicoman/ • https://www.iaea.org/topics/cancer-treatment-radiotherapy • https://www.radiologyinfo.org/en/info.cfm?pg=ebt • https://www.cancer.gov/about-cancer/treatment/types/radiation-therapy/radiation-fact-sheet
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. N/A

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) There are enough classrooms provided with a good accommodation, including good air condition, good Data show, suitable white board.
2. Computing resources (AV, data show, Smart Board, software, etc.) In each classroom and laboratories, there is a data show, and board.
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Each Class room and laboratories require a TV screen at least 65 inch-and smart, and double layer white board

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • Course reports • Course evaluation.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department • Revision of student answer paper by another staff member. • Analysis the grades of students.
3 Processes for Improvement of Teaching

- Preparing the course as PPT.
- Using scientific flash and movies.
- Annual updating of course content.

4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)

- The instructors of the course are checking together and put a unique process of evaluation.
- Check marking of a sample of papers by others in the department..
- Evaluation by the accreditation committee in the university.

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

1- The following points may help to get the course effectiveness
   - Student evaluation
   - Course report
   - Program report
   - Program Self study
2- According to point 1 the plan of improvement should be given.

Name of Instructor: **Prof. Dr. Prof. Saud Allehyani**

Signature: ___________________________ Date Report Completed:

Name of Field Experience Teaching Staff : ....

Program Coordinator:
Signature: Date Received:

Head of Department:

Signature: Date Received: