Course Specification

Physics, Plan 19

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation and Assessment

Course Specification

(1) General Physics 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: 1th Level-1th 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 **Topics**	**No of weeks**	**Contact Hours**
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 7. Surface tension	2 weeks	6

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.

- 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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(2) 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.) 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.

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

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(3) General Physics 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

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Quizzes + homework	Every 2 weeks	10%
2	Lab reports	Every week	5%
3	Lab final exam	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 and Assessment

Course Specification

(4) 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		
3- Vector or Cross product		
4- Triple Scalar Product, Triple Vector Product		
5-Gradient		
6- Divergence	2weeks	8hrs
7-Curl X		
8- Successive Application of operator		
9-Vector Integration		
10-Gauss's Theorem		
11- Stokes's Theorem		
Coordinate Systems		
1- Curvilinear Coordinates		
2- Differential Vector Operations		
3- Cartesian Coordinates	1week	4 hrs
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	2weeks	8 hrs
6-Meson Decay		
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

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

Ask quality question.

b. Cognitive Skills

(i) Cognitive skills to be developed

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

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

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

Ask the student to do small research.

(iii) Methods of assessment of students cognitive skills

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

c. Interpersonal Skills and Responsibility

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

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

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

1. Learn how to search the internet and use the library.
2. Learn how to cover missed lectures.

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

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

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

d. Communication, Information Technology and Numerical Skills

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

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

Feeling physical reality of results

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

1. Know the basic mathematical principles.
2. Use the web for research.
3. Discuss with the student.
4. Exams to measure the mathematical skill.
5. Clear the weakness point that should be eliminated.
6. Encourage the student to ask for help if needed.
7. Computational analysis.
8. Data representation.
9. Focusing on some real results and its physical meaning.
10. Lectures for problem solution.
11. Encourage the student to ask good question to help solve the problem.

Display the lecture note and homework assignment at the web.

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

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

e. Psychomotor Skills (if applicable)

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

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

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

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Midterm 1	5th week	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

(5) 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**	**Practical**/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

Assessment	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

(6) 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	9 hours
1. Simple harmonic motion; periodic functions		
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	3 weeks	9 hours
1. Separable equations		
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.

- 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

5. Homework assignments.
6. Quizzes.
7. Term paper.
8. 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.

- 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 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

(7) 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

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	**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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(8) 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
A**mmeters, 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

Assessment	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 & Assessment

Course Specification

(9) 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

Assessment	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

(10) Classical Mechanics (2) 403245

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: Classical mechanics (2) (PH 245)
2. Credit hours: 3Cr. 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. AbdelRahman Lashin**
5. Level/year at which this course is offered : Fourth Level
6. Pre-requisites for this course (if any): 241 PH
7. Co-requisites for this course (if any)
5. 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:

1. To discuss the fundamental concepts in classical mechanics;
2. To discuss the fundamental concepts of impulse, collision and motion of a body with variable mass
3. To understand the physical basis of mechanics and dynamics of rigid body
4. To analyse the center of mass and moment of inertia of a rigid body
5. To describe the theorems of static equilibrium of rigid body
6. Use of matrices in rigid body dynamics
7. To build the link between Physics theories and ideas with applications in the students daily life.
8. To discuss the Euler's equation of motion of a rigid body
9. To realize that the Lagrangian and the Hamiltonian formalism derived from the "least action principle" though they are alternative formulation of Newton's second law they are more general and allow to derive the relation between symmetries and conservation laws
10. To use Lagrangian and the Hamiltonian formalisms to solve mechanical problems.
11. The overall goal is to use the scientific method to come to understand the enormous variety of classical mechanics 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

Topic	No of Weeks	Contac thours
Dynamics of Systems of Many Particles: Scattering ; comparison of Laboratory And centre of mass coordinate systems, impulse and collision, Motion of a body with variable mass (rocket motion), Examples	3	9
Mechanics of Rigid Bodies , Planar Motion: Center of mass of a rigid body, Some theorems of static equilibrium of rigid body, Rotation of a rigid body about a fixed axis (Moment of inertia), Calculation of the moment of inertia, the physical pendulum, General theorem concerning angular momentum, Laminar motion of rigid body, body rolling down in inclined plane	4	12
Motion of Rigid Bodies in Three Dimensions: Angular momentum of a rigid body, Use of matrices in rigid body dynamics (the inertia tensor), determination of principle axes, rotational kinetic energy of a rigid body, Moment of inertia of a rigid body about an arbitrary axis, Euler's equation of motion of a rigid body, Free rotation of a rigid body with an axis of symmetry , Gyroscopic precession motion of a top.	4	12
Lagrange Mechanics: Generalized coordinates, generalized forces, Lagrange's equations, Some Applications of Lagrange's equations, generalized moments ignorable coordinates, Hamilton's variational principle ,The Hamiltonian function (Hamiltonian equation), Lagrange's equations of motion with constrains, Examples	3	9

2 Course components (total contact hours per semester):			
Lecture: 42 hrs	Tutorial: 32hrs	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

1. Developing important physical concepts of classical mechanics
2. Understanding mechanics and dynamics of rigid body
3. Deriving equations of motion from the least action principle.
4. Classification of the motion of rigid bodies (Eular classification).
5. To use mathematical formulation to describe the physical principle or phenomena.
6. 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

Assessment	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	15%
4	Final exam	16	55%

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 hours4 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. Analytical Mechanics. G.R. Fowles 2. Classical Mechanics. T.W.B. Kibble and F. H. Berkshire. 3. Classical Dynamics of particle and system J, Marion and T. Thoronton
4-.Electronic Materials, Web Sites etc http://academicearth.org/lectures/modern-physics-classical-mechanics-2
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 · 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

(11) Statistical thermodynamics 403213

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**:** Statistical thermodynamics, Phys 403213
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***
4. Name of faculty member responsible for the course **Dr. / Ahmed El-hadi**
5. Level/year at which this course is offered Third year
6. Pre-requisites for this course (if any) 101Phys. or 102 Phys**.**, modern physics, understanding of 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 Summary of the main learning outcomes for students enrolled in the course. 1. Understanding of the basic principles of Statistical Thermodynamics, mainly the method of thermodynamic ensembles. 2. Make the connections between classical equilibrium thermodynamics and the basic statistical mechanics, which includes analytical and numerical calculations of Partition Functions, towards solutions of various problems, including the problems about 1) ideal and real gases, 2) simple models of solids, 3) quantum gases, and other thermodynamic systems.. 3. Explanation statistical of systems that contains large number of particles, 4. Statistical distribution functions: Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac.
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) Students are training to use a mathematical algebra system to carry out integrals and make plots for complex formulas of thermal physics, so that they are able to understand and explain many of the thermal properties of matter, including quantum gases.

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 five parts

Topics	No of Weeks	Contact hours
1. Basics of probability and statistics: probability distributions, statistical averages, law of large numbers, random walk, examples of various distributions. Thermodynamics entropy, distinguishable and indistinguishable particles, Boltzmann statistics, Maxwell-Boltzmann distribution. Foundations of statistical mechanics. Microstates. Quantum and classical systems.	3W	9
2. Partition function of an ideal gas, diatomic gas: vibrational and rotational modes, the total heat capacity of a diatomic gas.	3W	9
3. Microcanonical, canonical and grand canonical statistical ensembles.	3W	9
4. Fermi-Dirac and Bose-Einstein statistics (calculated by two methods), and applied to free electron theory and Bose-condensation.	3 W	9
5. Thermodynamics of radiation, blackbody spectrum, Bose-Einstein gases, Bose-Einstein condensation, liquid helium	3W	9

Text books and References:

1. 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.
2. L. 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.
3. M.D. Sturge, Statistical and Thermal Physics, Fundamentals and Applications (A.K. Peters, Natick, Massachusetts, 2003) ISBN 1-56881-196-9.
4. Herbert B. Callen, Thermodynamics and an Introduction to Thermostatistics (John Wiley & Sons, New York, 1985) ISBN 0-471-86256-8.
5. Charles Kittel and Herbert Kroemer, Thermal Physics (W.H. Freeman, New York 1980) second edition ISBN 0-7167-1088-9.
6. Hill, T. L., An Introduction to Statistical Thermodynamics.

2 Course components (total contact hours per semester):

Lecture: 41 hr	Tutorial: 12	Practical/Fieldwork /Internship: 0	Other: Office hours : 12 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)

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

The aim of the course is that on its completion students will have acquired the following skills and knowledge:
• the ability to understand and apply the principles of statistical mechanics on ensembles of molecules.
• the ability to understand the association between statistical mechanics and thermodynamics.
• deep understanding of how intermolecular interaction affects the properties of matter
• the ability to use statistical mechanical computer programmers to calculate the properties of macroscopic systems.

(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

We will apply the principles of statistics to develop (1) the concepts of ensembles and distribution functions; (2) statistical mechanical expressions for thermodynamic functions; (3) models of polyatomic gases, monatomic crystals, polymers.

(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 same physical method, 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 , 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

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	**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. 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.
2. Essential References; 1. M.D. Sturge, Statistical and Thermal Physics, Fundamentals and Applications (A.K. Peters, Natick, Massachusetts, 2003) ISBN 1-56881-196-9.
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 classical and statistical thermodynamics.
5- Other learning material such as computer-based programs/CD, professional standards/regulations There are so many computer programs that can be used for Statistical Mechanics calculations such as Mathematica, Maple, Matlab,…etc

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 on,
2. Computing resources Calculator, Computer Lab.
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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(12) 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		

1. Laplace equation	3.5 weeks	10 hours
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.

- 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.

- 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

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Course Specification

(13) Electromagnetism (I) 403332

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: Electromagnetism I (PH 332)
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:
5. Level/year at which this course is offered: 5^{th} Level-3^{th} year
6. Pre-requisites for this course (if any): Pre-Requisite 221 PH + 246 PH
7. Co-requisites for this course (if any): Electricity and Magnetism (PH 211)
8. Location if not on main campus : University Campus

B Objectives

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

- This course is concerned in the laws of electromagnetism from our everyday experience by specific examples of how electromagnetic phenomena manifest themselves. The main ideas of electromagnetism can be encapsulated in the calculation of electrostatic problem using Laplace's and Poisson equations We **The main learning outcomes are as follows:**
- To understand basic fundamentals of electromagnetic phenomena: Physics of electrostatic field, electrostatic potential, the electrostatic field in dielectric materials, Microscopic theory of dielectric and electrostatic energy
- The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)
- 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.
- The day life applications in the domain of these electromagnetic phenomena
- To analyse electric systems using a required basics
- To understanding behaviour of components with direct and with alternating current.
- 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

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 strategy of the course in the beginning of the semester
- Outlines of the physical laws, principles and the associated proofs.
- Highlighting the day life applications whenever exist.
- 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
- 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 Covered		
Topics	No of weeks	Contact Hours
Electrostatics	2 weeks	6 hrs
1-Electric Charge		
2-Coulomb		
3-The Electric Field		
4-Electrostatic Potential		
5-Conductors & Insulators		
6-Gauss's Law		
7-The Electric Dipole		
8-Multipole Expansion		
Solution of the Electrostatic Problem	4 weeks	12 hrs
1-Poisson's Equation		
2-Laplace's Equation		
3-Laplaces's Equation in one		
Independent Variable		
4-Laplace's Equation in Spherical Coordinates		
5-Conducting Sphere in Uniform		
6-Cylindrical Harmonics		
7-Electrostatic Images		
8-Point charge & Conducting Sphere		
9-Line charges & Line Images		
10-System of Conductors		
11-Poisson's Equation		
The Electrostatic Field in Dielectric Media	3 weeks	9 hrs
1-Polarization		
2-Field Outside of a Dielectric Medium		
3-The Electric Field Inside a Dielectric		
4-The Electric Displacement		
5-Electric Susceptibility and Dielectric Constant		
6-Point Charge in a Dielectric Field		
7-Boundary Conditions on The Field Vector		
8-Boundary Value Problem Involving Dielectrics		

9-Dielectric Sphere in a Uniform Electric Field		
MICROSCOPIC THEORY OF DIELECTRICS	2 weeks	6 hrs
1-Molecular Field in Dielectric		
2-Induced Dipoles		
3-Polar Molecules		
4-Ferroelectricity		
ELECTROSTATIC ENERGY	1.5 weeks	4.5 hrs
1-Potential Energy of a Group of Point Charges		
2-Energy Density of an Electrostatic Field		
3-Energy of a System of Charged Conductors		
4-Capacitors		
ELECTRIC CURRENT	1.5 weeks	4.5 hrs
1-Current Density & Equation of Continuity		
2-Ohm's Law		
3-Steady Currents in Continous Media		
4-Microscopic Theory of Conduction		

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

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

- Learning fundamentals in electromagnetic theory
- Understanding the physics of electromagnetism 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.

(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. Board
    b. Power point
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.

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	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)
Electromagnetism Principles and Applications by Paul Lorrain and Dale R. Corson Physics for scientists and engineering by Serway 7^{Th} edition 3] Physics by : Halliday, D and Resnick, Krane
[4] Physics for student of science and Engineering by A.L.Stanford and J.M. Tanner
4-.Electronic Materials, Web Sites etc 1. http://www.physicsclassroom.com 2. http://www.eskimo.com 3. http://ocw.mit.edu/OcwWeb/Physics/8-02Electricity-and-Magnetism/VideoLectures/index.htm
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 optics (there is a special course for laboratory related to electromagnetic)

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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(14) 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 5th Level-3th 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

(15) 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: **3rd year (6th 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

(ii) 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

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)
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

(16)Theoretical Methods of Physics (3) 403346

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 Phys. **346** Theoretical Methods of Physics (3)
2. Credit hours
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 **Prof. Dr. Khaled Abdel-Waged**
5. Level/year at which this course is offered: Level
6. Pre-requisites for this course (if any) Pre-requisite **403242 for Phys 346**
7. Co-requisites for this course (if any)
7. Location if not on main campus
B Objectives 1. Summary of the main learning outcomes for students enrolled in these courses. The objective of this course is to provide the student with the mathematics he needs for advanced undergraduate and beginning graduate study in physical science and to develop a strong background for those who will continue into the mathematics of advanced theoretical physics. The benchmark statement of the main learning outcomes are to illustrate the relevance of mathematics to the Physical science. For example, the subject of partial differential equations in Phys. 346 is dealt not with a series of trick solutions of abstract, relatively meaningless puzzles, but the solutions and general properties of the differential equations the student will most frequently encounter in a description of real physical world. Many of the physical examples used in these courses are taken from the fields of electromagnetic theory and Quantum Mechanics. The overall goal is to show Mathematics as a useful and elegant tool for Physics.
2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

The contents of these courses, however, should be modified as follows:

- For Phys 346:
The credit hours should be increased from 2 to 3 hours.
Also, the following chapters should be added:

- **"Green function"** , which is very useful, especially in electrodynamics**.**
- **"Tensor analysis**", which is very useful in Nuclear and Particle physics**.**
- The "**Dirac-Delta Function**" is missed in this course and should be added since it is used in many Physics courses, e.g., Quantum Mechanics, Electromagnetism 1 and 2 and others. This "Dirac Delta" function should be taught from the book of "Eugene Butkov, Mathematical Physics, World student series edition (1973)."

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

1 Topics to be Covered

Topic	No of Weeks	Contac thours
PHYS 346:		
PARTIAL DIFFERENTIAL EQUATIONS	**5**	**10**
INTEGRAL TRANSFORM	**4**	**8**
FUNCTION OF A COMPLEX VARIABLE	**6**	**12**

2 Course components (total contact hours per semester):

PHYS 346 : 30 CONTACT HOURS PER SEMESTER

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

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

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

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

a. Knowledge

(i) Description of the knowledge to be acquired:

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

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

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

2-Solve some examples during the lecture.

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

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

5- Build a strategy to attack the problem.
6- Brain storming sessions.

(iii) Methods of assessment of knowledge acquired

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

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

d) Final exam

3- Always ask questions during the lecture.

b. Cognitive Skills

(i) Cognitive skills to be developed

1- How to use mathematics to understand physical problems

2- How to simplify mathematical problem

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

4- Analyse and explain natural physical problem.

5- Represent physical problem mathematically.

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

1- Following some proofs.

2- Define duties for each chapter.

3- Homework assignments.

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

5- Ask the student to do small research

(iii) Methods of assessment of students cognitive skills

1- Short quizzes, Midterm and final exams.

2- Ask about Mathematical laws previously taught.

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

c. Interpersonal Skills and Responsibility

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

The utmost goal is how to learn and work independently.

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

1- Learn how to cover missed lectures.

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

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

4- Develop interest in science thought.

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

1- Quizzes on the previous lecture.

2- Discussion

3- Present required problems on definite time.

d. Communication, Information Technology and Numerical Skills

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

1- Problem Solving

2- Interpretation of the results

3- Feeling the Physical reality of the results

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

1- Knowing the basic mathematical principles

2- Use the web for research

3- Frequent Exams to measure the Mathematical skills

4- Clear the weakest points

5- Encourage the student to ask for help

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

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

1- Exams and homework assignments should focus on the understanding

2- Their interaction with the lectures and discussions.

e. Psychomotor Skills (if applicable)

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

(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	12th week	5
4	Homework	Every week	5
5	Final Exam		60

		End of semester	

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week) 8 office hours per week

E Learning Resources

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

F. Facilities Required

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

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

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department
3 Processes for Improvement of Teaching
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(17) QUANTUM MECHANICS (2) 403345

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: QUANTUM MECHANICS (2), 403345
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 6^{th} level of the second year see plan
6. Pre-requisites for this course (if any) QUANTUM MECHANICS (1), PHY 403344 The course also requests knowledge of Maxwell's equations and achieved theoretical methods studies.
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. By the end of the course, students should understand each major concept of the following and be able to demonstrate their understanding in problems resolving as well as in applications in modern physics and in this field: - method of operators (lowering operator, rising operator, ...) - matrix representation - interactions of electrons with the magnetic field - addition of angular momenta and spin. - approximation methods to solve Schrödinger 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)

- Show the importance of the quantum mechanics in modern physics (atomic physics, nuclear physics, ...) and research (nanotechnology, ...), and explain the syllabus of the course in the beginning of the semester.
- Before each chapter and at the beginning of the semester, make a briefly review about the important mathematical tools that will be used and ask students to complete their gaps by reviewing their courses if they have some problems in using these tools.
- Make a soft (in power point and/or pdf) and hard copy of lectures.
- Outlines of the physical laws, principles and the associated proofs.
- Highlighting the day life applications whenever exist.
- Encourage the students to exploit the simulation physics programmes of the subjects discussed in lectures if they exist, and to see more details in the reference books in the library and the international web sites.
- Resolving and discussing some selected problems in each chapter.
- Cooperate with different institutions to find how they deal with the subject
- Renew the course references frequently

Frequently check for the latest discovery in the field of quantum mechanics and its applications.

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		
Chapter 1: OPERATOR METHODS IN QUANTUM MECHANICS 1.1- The harmonic oscillator problem 1.2- The interpretation of the wave function as probability amplitude 1.3- The time development of a system in terms of operators	3 weeks	9 hr
Chapter 2: INTERACTION OF ELECTRONS WITH ELECTROMAGNETIC FIELD 2.1- Maxwell Equations 2.2- Coupling of Electrons to Vector Potential 2.3- The Normal Zeeman Effect 2.4- Electron Motion in a Uniform Magnetic Field (Correspondence Principle)	1 week	3 hr
Chapter 3: OPERATORS MATRICES & SPIN 3.1- Matrix Representation of Harmonic Oscillator Operators 3.2- Matrix Representation of Angular Momentum Operators 3.3- Spin 1/2 Matrices 3.4- Paramagnetic Resonance	2 weeks	6 hr
Chapter 4: THE ADDITION OF ANGULAR MOMENTA 4.1- The Addition of Two Spins 4.2- Spin-Orbital Angular Momentum Addition 4.3- The Exclusion Principle & Angular Momentum States	2 weeks	6 hr
Chapter5: TIME INDEPENDENT PERTURBATION THEORY 5.1- First-order Perturbation Shift 5.2- Second-order Perturbation Theory 5.3- The Stark Effect	2 weeks	6 hr
Chapter 6: THE HELIUM ATOM 6.1- First-order Energy Shift Due to e-e Repulsion 6.2- The First Excited States 6.3- The Ritz Variational Principle	2 weeks	6 hr

Chapter 7: TIME DEPENDANT PERTURBATION THEORY	1 week	3 hr
Chapter 8: THE WKB APPROXIMATION	1 week	3 hr

2 Course components (total contact hours per semester):			
Lecture: 42 hr	Tutorial: 30 hr	Practical/Fieldwork /Internship:	Other: Office hours : 42 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 hours per 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 quantum mechanics theory
- Understanding the quantum physics precisely the approach methods to solve Schrodinger equation such as perturbations and JWKB
- Understanding the notion of spin and its usefulness in matter
- 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

- 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:
- a) Quizzes
- b) Short exams (mid term exams)
- c) Long exams (final)
- d) 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

- 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.

(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

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, 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

- Quizzes on the previous lecture
- Checking report on internet use and trips
- Discussion
- 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.

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

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

- Know the basic mathematical principles.
- 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.
- Lectures for problem solution.
- 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

- Their interaction with the lectures and discussions.
- The reports of different asked tasks.
- Homework, Problem solutions assignment and exam should focus on the understanding.
- Results of computations and analysis.
- 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	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- Quantum Physics by Gasiorowicz; A Wiley International Edition

2- Introduction to quantum Mechanics (second edition)

4-.Electronic Materials, Web Sites etc

- http://www.physicsclassroom.com
- 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.)
   - 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

(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

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

2- 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

(18) 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: 6th 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

Assessment	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

(19) Electromagnetism II 403342

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: Electromagnetism (PH 342)
Credit Hours: 3 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 Prof. Dr. Roshdi Seoudi Mohamed Awed
Level/year at which this course is offered 6^{th} Level-3^{th} year
Pre-requisites for this course (if any) Electromagnetism (I) (PH 332)
Co-requisites for this course (if any): Electricity and Magnetism (PH 211)
Location if not on main campus : University campus

B Objectives

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

1. This course is concerned in the electromagnetic fields and electromagnetic radiation. The main ideas of electromagnetism can be encapsulated in the famous Maxwell's equations and these can be used to explain the properties of light.
2. Magnetism (Biot-Savart and Lorentz force laws), Faraday's law covering magnetic induction and the Ampere-Maxwell law covering magnetic fields due to currents and so-called displacement currents were discussed.
3. A lot of time looking at electromagnetism in bulk materials (permittivity and permeability, D and H fields) and investigating the concepts of field potential and energy was spent.
4. Maxwell's equations may have resulted in the triumphal prediction of electromagnetic radiation, but it's surprisingly hard to derive the specific equations for the radiation from an antenna.
5. This course is important for the students whose study wave physics and their relationship to electromagnetic theory.

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- Development of the electromagnetism is to examine the learning outcomes for the courses in the electromagnetic stream.

2- 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.
3- Circulate this concept list to a range of electromagnetism 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 Magnetic Field of Steady Current 1. Magnetic Induction, 2. Force on Current Carrying Conductor, 3. The Biot-Savart Law, Calculation of the magnetic field intensity resulting from the current passes through (wire, curricular, electric coil, helical) 4. Ampere's Law (differential and integral shape) 5. Application of Ampere's law 6. The Magnetic Vector Potential, 7. The Magnetic Scalar Potential 8. The Magnetic Flux	**3**	**9**
The Electromagnetic Induction 1- Self Induction 2- Mutual Induction 3- The Neumann Formula	**1**	**3**
Magnetic Properties of Matter 1. Magnetization, Magnetic Current density 2. Magnetic Field Produced by a Magnetizing Material 3. Calculation of the Magnetic Field out of Magnetizing Material, Magnetic Scalar Potential 4. Sources of Magnetic Field and Magnetic Intensity, 5. The Field Equation, Magnetic Susceptibility Permeability – Hysteresis, Boundary Conduction of Field Vector 6. Boundary Value Problem Involving Magnetic Materials, Current Circuits Conducting Magnetic Media	**4**	**12**
Microscopic Theory of Magnetic Properties of Matter	**2**	**6**

1- Molecular Field 2- Origin of Diamagnetism 3- Origin of Paramagnetism 4- Ferromagnetic Theory 5- Ferromagnetic Domains 6- Ferrites		
Magnetic Energy	**1**	**3**
8- Magnetic Energy of Coupled Circuits, 9- Energy Density in Magnetic Field, 10- Force and Torques on Rigid Circuits		
Maxwell's Equation's and Electromagnetic Waves	**3**	**9**
1- Displacement Current, 2- Maxwell's Equation's 3- Wave Equation for Electric and Magnetic Field 4- Plane Wave 5- Plane Waves in Isotropic Insulating Media 6- Transfer of Plane Waves in Conductor 7- The Wave Equation with Sources 8- Boundary Conditions, the Wave Equation with Sources		

2 Course components (total contact hours per semester):			
Lectures: 42 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)

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 fundamentals in electromagnetic theory
3- Understanding the physics of electromagnetism 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..

b. Cognitive Skills

(i) Cognitive skills to be developed

1- Ability to analyse the observed electromagnetic field intensity

3- Ability to understand the functioning of electro- magnetic devices

4- To understand the theoretical treatments of electromagnetic problems

5- 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 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.
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)

Foundations of Electromagnetic Theory by John R. Reitz, Frederick J. Milford, Robert W. Christy, Addison Wesley 2008

2. Essential References

I.S. Grant and W.R. Phillips, Electromagnetism, Second Edition, John Wiley & Sons, New York, 2008.

3- Recommended Books and Reference

1. George E. Owen, Introduction to Electromagnetic Theory, Dover Publications, Inc., Mineola, New York, 2003.
2. John David Jackson, Classical Electrodynamics, Third Edition, John Wiley & Sons, New York, 1999.
3. W.N. Cottingham and D.A. Greenwood, Electricity and Magnetism, Cambridge University Press, Cambridge, 1991.

4- Electronic Materials, Web Sites etc Journal of Electromagnetic Waves and Applications http://en.wikipedia.org/wiki/Electromagnetism http://www.dmoz.org/Science/Physics/Electromagnetism/

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 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 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

(20) 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

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] 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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(21) Workshop 403382

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: Workshop (382)
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) B.Sc Degree in Physics
4. Name of faculty member responsible for the course: El-Husseiny El Taher Mahdy Mohamed
5. Level/year at which this course is offered: Third year
6. Pre-requisites for this course (if any) Pre-Requisite 242 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.

The objectives of this course are to guide the Students that they must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds, or experiments described herein. In using such information or methods they should be mindful of their own safety and the safety of others, including parties for whom they have a professional responsibility.

By the end of this course the students will be able to:

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

1. Know the principles of engineering drawing.
2. Use the drawing tools and understand the foundations and rules.
3. To prepare students for the use of measuring instruments and drawing the necessary accuracy.
4. Develop of the creative ability to imagine and perception of different geometric shapes.
5. Acquire the basic engineering experience of practice in the field of engineering drawing.
6. Able to use the engineering drawing experience in different artistic fields.

The overall goal is to use the scientific method to come to understand the Functional purposes of the engineering drawing.

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. Highlighting the day life applications whenever exist.
3. Encourage the students to see more details in the international web sites and reference books in the library.
4. Discussing some selected problems in each chapter.

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		
ENGINEERING AND INDUSTRIAL DRAWING:		
First: Engineering Drawing:		
The concept of course (graphic as a language)		2hr
Drawing tools and how to use		
Types of drawing papers and standard sizes, and scales	1 week	
DEFINATIONS	2 week	4hr
Point - straight - level - the body		
Kinds of lines - lines ratios		
1 - Visible line		
2 - Hidden Line		
3 - Central Line		
4 - Extension Line		
5 - Section line		
Applications		
APPLICATIONS ON THE USE OF ENGINEERING TOOLS AND GUIDELINES		
Applications on the use of engineering tools and guidelines	1 Week	2hr
Construct complex polygons	1 Week	
Construct a square by it's diagonal .		
Construct a rectangle by it's diagonal and side		2hr
Applications		
Construct a Pentacle by it's diagonal	1 Week	2hr
Construct a hexagon by it's diagonal and Circle which touch the heads of hexagonal		
SECOND: INDUSTRIAL DRAWING		

Definition of industrial design	2 Week	4hr
The purpose of the graphic industry		
Methods of drawing and projection		
First :Convergent Projection		
Perspective Pictorial Drawing		
Second: the parallel projection		
1-Isometric projection		
2-Orthograpic projection		
Find a three-engineered projections	1 Week	
Study by Isometric Projections		
APPLICATIONS ON PROJECTION		
Engineering perspective, the conclusion of the three projections	1 Week	2hr
Application		
Find a third of the projected from known tow projections.		
Application		
INTERSECTIONS	1 week	2hr
The concept of Intersections		
How to find a Intersection	1 week	2hr
Types of the Intersections		
APPLICATIONS ON INTERSECTION	2 week	4hr
Applications on the Intersections		
Comprehensive application		

2 Course components (total contact hours per semester):			
Lecture: 28 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

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

- Learning fundamentals in engineering and industrial drawing:
- Acquire the basic engineering experience of practice in the field of engineering drawing.
- Abel to use the engineering drawing experience in different artistic field.
- Improving logical thinking.
- To use mathematical formulation to describe the physical principle or phenomena
    - Ability to explain how things work.

- Teaching strategies to be used to develop that knowledge

1. Demonstrating the basic information and principles through lectures and the achieved applications
2. Discussing Subject lessons 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;

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.

Ask quality question.

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 Subject lessons
- 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

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.

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

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. Lectures for problem solution.
9. 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. Discussion the results and analysis.
5. Comments on some resulting.

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	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] Geometric and Engineering Drawing by K . MORLING 3Th edition [2] Engineering Drawing for Manufacture, by B.Griffiths 1st Edition [3] Engineering Drawing, by M.B.Shah and B.C.Ranas 1st Edition 4-الرسم الصناعي والهندسي تأليف: د.حسن حسين فهمي
4-. Geometric and Engineering Drawing, Web Sites etc http://www.alhandasa.net/ http://www.tkne.ne
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 optics (there is a special course for laboratory related to electromagnetic)
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. **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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(22) Advanced optics 403432

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: Advanced optics PH 432
2. Credit hours: 3 cr. Hr.
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: Fourth year
6. Pre-requisites for this course (if any) PH 231- PH 346
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 through light on an advanced study for light and its application in interference, diffraction using new mathematical treatment with high accuracy.

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

1. To understand basic Fundamentals of advanced optics and its relation with 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 these 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 the 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 built an example of different experiments related to 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		
Topic	No of Weeks	Contac thours

The Fourier analysis approach to physical optics		
1- Fraunhofer Diffraction	1 week	3
2- Fraunhofer Diffraction by a single slit		
3- Fraunhofer Diffraction by a circular aperature 4- Apodization		
5- Fresnel diffraction	1 week	3
6- More exact diffraction theories		
7- Fourier analysis and Fourier optics		
Optical Functions:		
- Basic principle , periodic objects	1 week	3
- A numerical example , image processing, the Abbe theory of microscope		
- Contrast improvement , derivations of the optical amplitude transfer functions	2 week	6
- Optical intensity transfer functions - Rresolving power		
- Wave theory of aberrations		
Holography:		
- Plane wave holography - Point source holography - Central body holography	1 week	3
- Practical consideration - Four dimension holography - Classification of holography	1 week	3
Paraxial ray matrix		
- Newtonians & Gaussianian equation - Snell law and lenses matrices	1 week	3

- Gaussianian constants and its significance - Approximation for this lenses	1 week	3
Skew rays and spherical aberration		
- Geometrical aberration fundamentals	2 weeks	6
- Non paraxial matrices		
- Spherical aberration		
Optical devices		
- Non spherical - Schemidt system	1 week	3
- Light as energy	1 week	3
- Chromatic aberration		

2 Course components (total contact hours per semester):

Lecture: 42	Tutorial: 13	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 basic fundamentals in advanced optics theories
- Understanding the physics of Diffraction, interference and their applications mentioned in the text.
- Improving logical thinking.
- 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 (midterm 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

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.

(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			
Assessment	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	10
4	Project	12th week	10
5	Solving problems	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) 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- Contemporary optics for scientists and engineering By A. Nussbaum and R.A Phillips 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
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 • 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 (d) 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)

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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(23) 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	2 weeks	6 hrs

4. An example of transistor circuit analysis ; Transistor operation at extremes of collector voltage		
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

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) 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.
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
• 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

(24) Radiation Physics 30403462

Course Specification

For Guidance on the completion of this template, please refer to 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: **Radiation physics, 30403462**
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 Physics
4. Name of faculty member responsible for the course Dr. Taha Mohamed taha alfawwal
5. Level/year at which this course is offered three year
6. Pre-requisites for this course (if any) Pre-Requisite 403361
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- They are understanding radiation protection,
2- They will be familiars with radiation background, interaction of radiation with matter, radiation quantities and units

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)

1. Explain strategy of the course in the beginning of the semester
2. Outlines of the introduction for radiation physical laws, principles and the associated proofs.
3. Highlighting the radiation experiments corresponding to a theoretical subject.
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- 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)

1 Topics to be Covered

Topic	No of Weeks	Contac thours
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
Interaction of radiation with matter		
Alpha particle interactions	2	6
Beta particle interactions		
Specific ionization		
Mass stopping power		

Linear energy transfer		
Bremsstrahlung		
Radioactive atoms- Nature and Behavior		
Alpha emission	2	6
Positron emission		
Orbital electron capture		
Beta emission		
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		
Radiation quantities and units		
Exposure	2	6
Absorbed dose and equivalent dose		
Radioactivity		

2 Course components (total contact hours per semester):			
Lecture: : 30 hr	Tutorial: 30 hr	Practical/Fieldwork/Internship: 15	Office hours : 24 hr Other: Paper has been published. Seminar in radiation protection in medicine

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

(ii) Improving logical thinking.

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

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

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;

Build a strategy to solve problem.

(iii) Methods of assessment of knowledge acquired

1. Exams:
    a) Quizzes
    b) Short exams (mid term exams)
    c) Long exams (final)
    d) Oral exams
2. Discussions with the students.
3. 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. 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

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 cover missed lectures.
2. Learn how to summarize lectures or to collect materials of the course.
3. Learn how to solve difficulties in learning: solving problems – enhance educational skills.
4. 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. Checking report on internet use and trips
2. Discussion
3. 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.

4. Quizzes on the previous lecture
5. Checking report on internet use and trips
6. Discussion
7. 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.

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.

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.
3. 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 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	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)

8 office hours per week

E Learning Resources

1. Required Text(s)
2. Essential References
1- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List) • Michael G. Stabin" Radiation Protection and Dosimetry" 2007.Ch5. p-p, 67-74 • Herman Cember " Introduction to Health Physics" 1983, 2003, 2009.Ch6. p-p, 135-142.,Ch.10-p. 529.
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.) 1. Lecture room for 20 students 2. Library Laboratory for medical radiation physics (there is a special course for laboratory related to medical radiation physics)
2. Computing resources

3. 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) 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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(25) Semiconductor Physics 403471

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: Semiconductor Physics 471PH
2. Credit hours 3 Cr 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)
5. Level/year at which this course is offered Fourth year
6. Pre-requisites for this course (if any) Pre-Requisite 371 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 application. It also discusses the effect of different physical parameters on semiconductors. At the end of this course the student should be able to 1. Understand how semiconductor devices work 2. Understand the different physical parameters on semiconductors
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
VIII- THE ELEMENTARY PROPERTIES OF SEMICONDUCTORS 1. Early work on semiconductors 2. Applications of semiconductors 3. Elementary theory for semiconductors 4. Control of carrier density	1 week	
IX- ENERGY LEVELS IN CRYSTALLINE SOLIDS 1. Wave mechanics of free electrons 2. Motion in a periodic potential 3. Forms of the energy bands 4. Positive holes 5. Motion of electrons and holes in a crystal under the influence of an external field of force 6. Energy-level diagrams 7. Resistance to motion of electrons and holes in a crystal	2 weeks	
X- IMPURITIES AND IMPERFECTIONS IN CRYSTALS 1- Types of imperfection 2- Chemical binding in semiconductors 3- Alternative approach to semiconductor designation 4- Substitutional impurities in semiconductors 5- Excitons	1 week	
XI- CARRIER CONCENTRATIONS IN THERMAL EQUILIBRIUM 1- Distribution of electrons between the various energy levels 2- Intrinsic semiconductors 3- Semiconductors with impurity levels	1 week	

XII- ELECTRON TRANSPORT PHENOMENA 1- Collisions with crystalline imperfections- Relaxation time 2- Constant relaxation time 3- Relaxation time as a function of E 4- Electrical conduction at very law temperatures	1 week	
XIII- THERMAL EFFECTS IN SEMICONDUCTORS 1- Thermal conductivity 2- Thermoelectric power 3- Thermoelectric effects 4- Condition of degeneracy 5- Strong magnetic fields 6- Relative magnitudes of the magnetic effects	2 weeks	
XIV- DIFFUSION OF ELECTRONS AND POSITIVE HOLES 1- Inhomogeneous semiconductors 2- Einstein's relationship 3- Departure from thermal equilibrium 4- Electron-hole recombination 5- Diffusion and conduction in extrinsic materials (n>>p or p>>n) 6- Drift of a pulse of minority carriers in an electric field 7- Near-intrinsic materials 8- Comparison of contact phenomena 9- The p-n junction 10- The n-n and p-p junctions 11- Surface effects 12- Metal-semiconductor contacts 13- Drift mobility of electrons and holes 14- Hetero junctions	2 weeks	
XV- SCATTERING OF ELECTRONS AND HOLES 1- Change of state 2- Scattering mechanism 3- Scattering by lattice vibrations 4- Phonons 5- Relaxation time of lattice scattering 6- Optical mode of scattering in polar semiconductors 7- Inter-valley scattering 8- Inter-electron scattering 9- Ionized impurity scattering 10- Neutral impurity scattering 11- Scattering by dissociation 12- Scattering contributions to mobility	2 weeks	

XVI- RECOMBINATION OF ELECTRONS AND HOLES 1- Recombination mechanism 2- Radiative recombination 3- Auger recombination 4- Recombination through traps 5- Recombination through excitons 6- Recombination at dislocations 7- Recombination with donors or Acceptors at low temperature 8- Surface recombination 9- Mean life time in filaments and thin strips	2 weeks	

2 Course components (total contact hours per semester):			
Lecture: 42 hrs	Tutorial:	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 different types of conduction
- Understanding the physics of semiconductors and their applications mentioned in the text.
- Improving logical thinking.
- Ability to understand and design simple semiconductor-based elements
- 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.

(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. 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

1. (i) Description of the skills to be developed in this domain.
2. Computation
3. Problem solving
4. Data analysis and interpretation.
5. 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	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] **Semiconductors** by Smith [2**]** **Physics of Semiconductors** by Sze
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
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

- Midterms and final exam.
- Quizzes.

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

(a) Course report
(b) Program report
(c) Program self study
- Fortification of the student learning.
- Handling the weakness point.

3 Processes for Improvement of Teaching

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

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

(27) Nuclear Technology 403463

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 Technology (403463)
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 Physics
4. Name of faculty member responsible for the course:
5. Level/year at which this course is offered: level 8
6. Pre-requisites for this course (if any) Pre-Requisite 361 PH + 362 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.

The course aims to introduce students to the types of fusion and fission reactions, as well as identify the products and how they are used in power generation, also deals with the decision to study the working of different types of particle accelerators and their applications.

The main learning outcomes are as follows:

1. To understand basic Fundamentals of fission and fusion reactions.
2. The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)
3. To know controlled chain reactions and their usages.
4. To know about un-controlled chain reactions and their disasters.
5. To know the cause of large amount of energy released in these reactions.
6. To describe, in words, the theory of fission and fusion process come into play in particular situations; to represent these nuclear phenomena mathematically in those situations; and to predict outcomes in other similar situations.

The overall goal is to use the scientific method to understand the sources of nuclear energy.

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
Topics		
FISSION REACTORS:		
1-Types of Fission Reactions	1 week	2hr
2- Slowing down of Neutron	2 week	1hr
3-Thermal Neutron Diffusion		1hr
4-Diffusion of Slowing Down Neutrons	3 week	1hr
5-Chain Reaction		1hr
6-Multiple Factors in an Infective Medium	4 week	1hr
7- Spear Neutron in the Absorption Process Thermal Utilization Factor		1hr
8-Resonance Escape Probability	5 week	1hr
9-Reproduction Factor of Fast Neutrons		1hr
10- Optimum Parameters of Reproduction Media	6 week	1hr
11- Critical Date of Reactor		1hr
12- Neutron Reflector	7 week	1hr
13-Non-Critical Reactor		1hr

14- Electricity Generating Reactors	8 week	2 hr
FUSION REACTORS:		
1-Plasma Physics (Introduction)	9 week	1hr
2- Plasma Coefficient		1hr
3-Basic Fusion Reactions	10 week	1hr
4- Characteristic of Fusion Processes		1hr
5-Controlled Nuclear Chain Reactor	11 week	1hr
ACCELERATORS:		
1-Electromagnetic Accelerators		1hr
2-Van de Graff and Tandom Van-de Graff	12 week	1hr
3-Cyclotron		1hr
4-Syncrotron	13 week	1hr
5-Betatron		1hr
6-Linear Accelerator	14 week	1hr

2 Course components (total contact hours per semester):			
Lecture: 28 hr	Tutorial: 20 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) 06 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

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

- The fundamental knowledge of nuclear theory.
- Knowledge of production of nuclear energy and its uses.
- Understanding the physics of fission and fusion reactions.
- Importance of controlled chain reaction.
- Knowledge of disasters of un-controlled chain reactions.
- To use mathematical formulation to describe the physical principle or phenomena.
- Ability to explain how things work.

Methods of assessment of knowledge acquired

1. Solve some examples 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 short conceptual questions.

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

(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. Asking for derivation that was derived in class.

c. Interpersonal Skills and Responsibility

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

1. 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 their interest in Science through :(lab works, field trips, visits to scientific and research institutions.

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

Encourage the student to ask questions during lectures.

(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

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.

(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 students to ask good questions 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.

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	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] Introduction of Nuclear Physics by A Enge [2] Introductory Nuclear Physics by KS Krane [3] Introductory Atomic and Nuclear Physics by Harvey E White [4]Plasma Physics by Cheu [5] Nuclear Physics by Irving Kaplan
4-.Electronic Materials, Web Sites etc • http://www.physicsclassroom.com • http://www.eskimo.com http://ocw.mit.edu/
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 nuclear experiments.
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.
Encourage the students to ask questions during lectures. Their questions will be the most helpful for them; they are also helpful for the teacher because they provide 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)

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.

Kingdom of Saudi Arabia

The National Commission for Academic Accreditation & Assessment

Course Specification

(28) Solid State Physics II 433472

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 (433472-3, PH 472)**
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 Physics
4. Name of faculty member responsible for the course: **Prof.Dr. Y.M. MOUSTAFA**
5. Level/year at which this course is offered: **Fourth year (8th level)**
6. Pre-requisites for this course (if any): **Solid State Physics I (433471-3, PH471)**
7. Co-requisites for this course (if any) --------
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 on Solid State Physics.
- Be familiar with the basic physics knowledge on Solid State Physics.
- Understand how X-Rays Diffraction can be used in studying the solid structure
- Understand and appreciate of the physical laws governing solids.
- Define and describe the Super conducting phenomena.
- Illustrate the band theory of solids.
- Discuss the different theories of electron in solids.
- Be familiar with the basic physical properties of 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 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
2- Superconducting Properties of Solids	2 week	6 hrs
1- Properties of Superconductor		
2- Magnetic Flux in Superconductor		
3-Thermodynamic Properties of Superconductor		
4- Superconduction Theory		
5- Josephson Effect		
3- 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		

5- Using of X-Rays for structural analysis of solids		
4-Free Electron Theory in Metals	1 week	3 hrs
1- Origin of conduction electrons		
2- The classical model of free-electron		
3- Electrical Conductivity of Metals According to the Classical Model		
4- Temperature Dependence of Electrical Conductivity		
5- Thermal capacity according to free electron gas model	1 week	3 hrs
6- Fermi surface and its Effect on electrical conductivity		
7- Thermal conductivity in metals		
8- Electron motion in a magnetic field		
9- AC Conductivity and Optical Properties		
5- Thermal Properties of Crystal Lattice		
1- Specific heat	1 week	3 hrs
2- Specific heat according the exact theory		
3- Thermal conductivity of solid		
4- Thermal expansion		

6- Energy Band Theory in Solids	1 week	3 hrs
1-Origin of Energy Bands in Solids and Classification of Solids		
2- Bloch Theorem for Energy Bands		
3- Energy Bands Symmetry Properties in k-Space		
4- Kronig-Penney Model for Calculating Energy Bands	1 week	3 hrs
5- The Nearly-Free Electron Model For Determining Energy Bands		
6- The Tight-Binding Model		
6- Dielectric Properties of Solids	2 weeks	6 hrs
1- Polarization and Polarizability		
2- Local Field		
3- Sources and typs of Polarizability		
4-Specification of Solids according to the dielectric loos		
5- Properties of Dielectric Material with AC Field		
6- Ferro-electricity		
7- Piezo-electric Effect		

7- Magnetic Properties of Solids	1 weeks	3 hrs

1- Basic Concepts		
2- The Origin of Magnetism in Solids		
3- Magnetic Susceptibility		
4- Classification of Magnetic Materials		
5- DIAMAGNETIC MATERIALS AND L ANGVIN THEORY		
6- Paramagnetic Materials	1 weeks	3 hrs
7- Pauli's Magnetic Susceptibility		
8- Ferromagnetic Materials		
9- Classification Ferromagnetic Materials		
10- Magnetic Domains and Some of Magnetic Applications		
8- The Semiconductors: Theory and Application	2 weeks	6 hrs
1- Energy Bands in Semiconductors		
2- Concentration of Intrinsic Charge Carriers		
3- Donors and Acceptors		
4- Electron Mobility in Semiconductors		
5- Resistivity and Conductivity of Semiconductors		
6- Photoconductivity and Photoluminescence		

7- p-n Junction		
8- Bipolar Junction transistors		

2 Course components (total contact hours per semester):			
Lecture: 48 hrs	Tutorial: 15 hrs	Practical/Fieldwork /Internship:20 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) knowledge that students should know and understand when they complete the course are as follow:

- Learning fundamentals in electron gas theory
- Understanding the physics of solid properties 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 physical properties work in solids.
- Learning theory and applications of the solid state.
- Methods of measurement and assessment of properties of solids

(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.
13. Encourage interactive learning and develop individualized interest

(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.
6. Short essays and application projects

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.
6. How to breakdown problems and analyze phenomena

(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:
    - 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

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)
8 office hours per week

E Learning Resources

1. Required Text(s)
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 • 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)

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

(29) Project 403493

Course Specification

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

A Course Identification and General Information

1. Course title and code: **Project PH-493**
2. Credit hours: **5 Cr. Hr.**
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 **Fourth year**
6. Pre-requisites for this course (if any) **None**
7. Co-requisites for this course (if any) **None**
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 **This course is dealing with a specific research point . this research point is carried by the student under the supervision of one of the academic stuff . the research point can be classified to two groups :** **A- Theoretical research projects.** **B- Experimental research project.** **We suppose that the student is able to:** **1- Do the experiments, the calculations** **2- Discussion of the obtained results** **3- The scientific writing**
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 project in the beginning of the semester** **2. Highlighting the day life applications whenever exist.** **3. Encourage the students to see more details in the international web sites and reference books in the library.** **4- 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		
List of Topics	No of Weeks	Contac thours
This course is dealing with a specific research point . this research point is carried by the student under the supervision of one of the academic stuff . the research point can be classified to two groups : **A- Theoretical research projects.** **B- Experimental research project.**	**15**	**30**

2 Course components (total contact hours per semester):				
Lecture: 10	Tutorial:	Laboratory	Practical/Field work/Internship 20	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 hours

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

Understanding one of the physical problems then dealing with it from a researcher point of view in order to solve it> the dealing can be

A- Theoretical
B- Experimental

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

1 Brain storming
2 Discussions
3 Encourage the concept of team work
4 Active teaching
5- cooperative learning
6 Self learning
7 solving problems

(iii) Methods of assessment of knowledge acquired

1. Exams:
2. Discussions during the lectures.
3. Ask the student to clear the misunderstanding of some physical principle and asking about quality question.
4- Home work
5- Writing scientific paper
6- Reports

b. Cognitive Skills

(i) Description of cognitive skills to be developed

1. Flexibility skills
2. Elaborating information skill
3.Accessing information skill
4. Note taking skill
5. Drawing conclusion skill
6. The skill of determining cause- effect relationship
7. The skill of generation and testing hypnoses
8. Inferring skill
9. Evaluating evidence skill
10. Managing attention skill
11. Problem solving skill
12. Prioritizing skill
13. Questioning skill

14. Thinking systematically skill

15. Sequencing skill

16. The skill of presenting information graphically

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

1. Brain storming

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

3. solving problems

4. Doing small research

5. modeling and simulation

(iii) Methods of assessment of students cognitive skills

1- exams

2- workshop

3- port files

4- feedback reports

5- team work projects

c. Interpersonal Skills and Responsibility

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

1. Responsibility for own learning

2. Group participation and leader ship

3. Act responsibly personal and professional situation.

4. Ethical standards of behaviour

5. Active communication skill

6. Self-learning skill

7. Time management

8. Respect the view of the others

9. Encourage the idea of team work

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

1. Brain storming

2. Group discussion

3. Experimental training

4. Encourage the student to attend general lectures.

5. Seminars

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

1. Discussion

2. Seminars

3- Home work

4- Reports

d. Communication, Information Technology and Numerical Skills

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

1. Computation and Problem solving skill

2. Using technology and programs for solving the difficulties in physics

3. Data analysis and interpretation

4- Using technology in presentations

5-Using technology in communications with others

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

1.Use the web for research.

2. Computational analysis.

3. Data representation.

4. Focusing on some real results and its physical meaning.

5. Lectures for problem solution.

6. Experimental training

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

1. Their interaction with the lectures and discussions.

2. The reports using technology.

3. Homework, Problem solutions assignment and exams

4. Results of computations and analysis.

5. doing research using internet

e. Psychomotor Skills (if applicable)

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

1- the ability use the experimental devices

2- the ability to choose the suitable component for the experiments

3- Doing the data representation in a definite time

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

1. Experimental training

2. Co-operative learning **3. Research projects**
(iii) Methods of assessment of students psychomotor skills **1. Presentations** **2. Recording the progress of the student**

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	**Attendance**	**2**	**10**
2	**Discussion of the research project point and the reference**	**2**	**10**
3	**Discussion of the main outline of the research point**	**3**	**20**
4	**Seminars**	**12**	**40**
5	**The team work projects**	**4**	**20**

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)
1- 4office hours per week
2- Helping the student in solving any problems

E Learning Resources

1. Required Text(s) **selected by the academic stuff**
2. Essential References **selected by the academic stuff**
3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

selected by the academic stuff
4-.Electronic Materials, Web Sites etc **selected by the academic stuff**
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 organized for face to face learning** • **Library** • **Laboratory** • **Boards** • **Suitable lightening system** • **Ac units** • **Fiber optic networks and wireless** • **Computers and data show**
2. Computing resources *** computers with data show** *** Available numbers of computers for students**
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list) **selected by the academic stuff**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching • **Evaluating the instructor by the student using questionnaires** • **Following up the progress of student in the course** • **Evaluating the progress of student by the projects and reports** • **Evaluating the course by specialized committees**
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department • **Self-evaluation** • **Student evaluation**

- **Evaluation by other instructor in the same department or outside it**

3 Processes for Improvement of Teaching

- **Course report**
- **Program report**
- **Program self study**
- **Handling the weakness point by the Accreditation committee in the department**

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)

- **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**
- **Independent evaluation by another instructor that give the same course in another faculty or 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**
2- **According to point 1 the plan of improvement should be given.**
3- **Contact the college to evaluate the course**
4- **Reviewing the course and updating it**