353 PHYS COURSE SPECIFICATION

2013

Course Specification

Institution: King Khalid University
College/Department : Faculty of Science / Physics Department

A Course Identification and General Information

1. Course title and code: Modern Physics (353 Phys)
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)** The Academic program at the Department of Physics
4. Name of faculty member responsible for the course Dr. Emad Fathy El-Shamy
5. Level/year at which this course is offered: Level III /Third year
6. Pre-requisites for this course (if any) : 231 Phys
7. Location if not on main campus: Department of Physics / Building C / Main Campus / Grigar / Abha.

B Objectives

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

This course is intended to give the student a short comprehensive introduction of the special theory of relativity and an introduction to the atomic theory of matter and charge. And also to convert the student from the classical (Newtonian) sense to the modern (quantum) sense of physics. It will teach quantum physics fundamentals and other main features of modern physics.

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

1 Topics to be Covered

Topic	No of Weeks	Contact hours
1- Special theory of relativity, hypothesis, Galilean and Lorentz transformation, the velocity transformations.	4	12
2- Particulate behavior of electromagnetic radiation, photoelectric effect, black body radiation, the Compton effect, and photon.	4	12
3- Matter waves and the uncertainty principles, De Boglie's hypothesis, wave packet basics properties of atoms, Thomson model, the Rutherford model, Bohr's model, the Frank-Hertz experiment, the correspond principle, Sommerfeld relativistic theory.	4	12
4- The Schrödinger equation and its applications, the hydrogen atom in quantum physics.	2	6

2 Course components (total contact hours per semester):

Lecture: 42	**Tutorial: _____**	**Practical/Fieldwork/Internship: No**	**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 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) Description of the knowledge to be acquired

1- This course is devoted to the theory of relativity. 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.
2- This course also summarizes the experimental findings that ultimately led to broad acceptance of energy quantization. The de Broglie hypothesis and experiments that validated it. The Bohr model of the hydrogen atom.
3- The student learns and knows the quantum mechanics of the hydrogen atom and the formal solution of the Schrödinger equation.

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

Lectures and self learning

(iii) Methods of assessment of knowledge acquired

1- In class short MCQs quizzes.
2- Major and final examinations.
3- Evaluation of the problems solutions of each chapter.
4- Attendance.

b. Cognitive Skills

(i) Cognitive skills to be developed

1- Tutorials and solving problems related to course contents.

2- Identify the recent technological advances that have allowed careful and precise experiments and have stimulated new interest in the field.
3- Summarize the experimental findings that ultimately led to broad acceptance of energy quantization.
4- Validate de Broglie hypothesis and experiments.
5- Apply the concepts of the theory of relativity and quantum theory in our life practice.

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

1- A number of homework is assigned to students.

2- Solving selected problems.

3- The studies related to the course topics and relevant national industries.

(iii) Methods of assessment of students cognitive skills

1- Encouraging the student to increase the lecture attendance.
2- A student follow-up is maintained using quick questions style.
3- Checking the solution of problems as well as the homework assignments.

c. Interpersonal Skills and Responsibility

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

1- Academic supervision is required.

2- Communicate results of the work to others.
3- Work independently and as a part of team.
4- Manage resources, time and other members of the group.

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

1- Assessment of the solution of problems.
2- Grading homework assignment.

d. Communication, Information Technology and Numerical Skills

None
e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required None
(ii) Teaching strategies to be used to develop these skills None
(iii) Methods of assessment of students psychomotor skills None

5. Schedule of Assessment Tasks for Students During the Semester

Assess-ment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	Mid term 1	After 7 weeks	22.5%
2	Mid term 2	After 14 weeks	22.5%
3	Home Works	At the end of every chapter	5%
4	Final examination	End of the term	% 50

D. Student Support

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

Office hours: 10 hours per week.

E Learning Resources

1. Essential References

Quantum Physics of Atoms / Eisberg
Modern Physics / Kenneth Krane
Elementary Modern Physics / Weidner & Sells
Elementary Modern Physics / Arry

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

E-Learning Black Board

F. Facilities Required

None

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

An academic evaluation is required continuously.

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

1- Evaluating the course outside the department.
2- Evaluating the course at the departmental levels.

3. 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)

None