Zarqa University
Faculty Science
Department: Physics
Course title: Modern Physics
0302262

Instructor: Dr. Ahmad Abuobaid
Lecture's time:9:30- 11:00, Mo-Wed
Semester: First Semester 2017/2018
Office Hours:12-1 (S, Tu, Th)

Course description:

Relativity (kinematics and dynamics), Wavelike properties of particles, Wave properties of waves, Atomic structure, quantum nature of radiation and Introduction to laser physics.

Learning Outcomes

- Understanding of the theory of relativity
- Knowledge of the fundamental aspects of space, time ,mater and energy
- Understanding of particles properties of waves and waves properties of particles
- Understanding of atomic structures and quantum nature of radiation
- Understanding of atomic structures and quantum nature of radiation

Aims of the course:

1. To understand the theory of relativity
2. To understand the physics of light /matter (wavelike properties of particles and waves properties of particles)
3. To understand the laser concepts and applications

Intended Learning Outcomes: (ILOs)

A. Knowledge and Understanding

A1. Concepts and Theories:

Theory of relativity, Lorentz transformation, wave behavior of particles and particle`s behavior of waves

A2. Contemporary Trends, Problems and Research:

Gravitational waves, quantum Entanglements

A3. Professional Responsibility:

Student can have critical-thinking Skills

B. Subject-specific skills

B1. Problem solving skills:

Time dilation, Length contraction, Energy-mass equivalent fundamentals, Light-matter interactions problems and atomic structure analysis.

B2. Modeling and Design:

Atomic models, Photoelectric effect and Compton scattering

B3. Application of Methods and Tools:.

Laser and X-ray diffraction.

C. Critical-Thinking Skills

C1. Analytic skills: Assessments

Twin paradox, Energy and Diffraction

C2. Strategic Thinking:

Applying relativity and energy concepts in industry (design, measure tools)

C3. Creative thinking and innovation:

Applying and understanding of the matter /energy concepts and special relativity in astronomy and industry

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Communication:

Establishing excellent interpersonal communications between the instructor and the students.

D2.Teamwork and Leadership:

1- Team work assignments.

2- Mutual respect between the student and the instructor.

3- Applying educational standard and behavior in professional manner when the students in groups

4- Providing technical help for challenged issues related to some problems in modern physics.

Course structures:

Week	Credit Hours	ILOs	Topics	Teaching Procedure	Assessment methods
1-4	3	A1,B3	**Special theory of relativity (kinematics and dynamics)**	Lecture, Oral inquiry	Class participation Solving including home work: problems:1,3,5,7,9,11,13 and 43
5-6	3	A2,D1 and D2, B3,C1	**Particles properties of waves**	Lecturing discussion	Solving problems including homwork:3, 7,9 ,13, 25, 43, 45and 49 Short-answer questions
7-8	3	A1,C2,C3, D1	**Wave properties of particles**	Lecture, Class discussion	Solving problems:3, 7,9, 17, 19, 27, 39, 43, 45and 49
9-10	3	A3,B1,B3,C 2,	**Nuclear atom, Electron orbit levels and, Bohr atom and Atomic spectra**	Lecture-demonstration Problem solving or case studies	Solving problems:5, 11, 19 and 23, 29 and 31
11-12	3	A1,C2,B3D1 and D3,A3	**Correspondence principle, Nuclear motion**	Lecturing discussion	Solving problems:35, 37 and 41
13-14	3		**Atomic excitation and Laser**	Lecturing discussion	Review

References:

A. Main Textbook:

"Concepts of Modern Physics", Arthur Beiser, 6th Edition

B. Supplementary Textbook(s):

1- Modern Physics. by Kenneth S. Krane, 3th Edition 2012, John Wiley & Sons Inc, Third Edition
2- http://web.pdx.edu/~pmoeck/lectures/Modern%20Physics%20for%20Science%20and%20Engineering%20%28eval%29.pdf

Assessment Methods:

Methods	Grade	Date
1st	20	
2nd	20	
Final	50	
Class Activities	10	