Zarqa University
Faculty Science
Department: Physics
Course title: Advanced Physics Laboratory 1 /0302365

Instructor: Dr. Ahmad Abu obaid
Lecture's time:1-5 PM, Sunday
Semester: Second Semester
Office Hours:11:00-12:30 (Mo &We)

Course description:

Different experiments will be performed in the laboratory for 4 hrs/week. These experiments are: Black body radiation, specific charge (e/m), Electron diffraction, Frank Hertz, Thermoelectricity. Solar energy, Hall-Effect, Magnetic field, and Microwaves interactions with materials.

Learning Outcomes

- Understanding of writing of high quality of technical reports based on experimental work
- Understanding of experimental errors in the test results
- Knowledge of the fundamental concepts for electromagnetisms
- Understanding of different advanced phenomena in the field of experimental physics

Aims of the course:

1. To understand different technical skills in the field of experimental physics
2. To learn how to write high quality reports
3. To conduct different fundamental experiments in the field of electricity and magnetism

Intended Learning Outcomes: (ILOs)

A. Knowledge and Understanding

A1. Concepts and Theories:
Electricity and magnetism theories, Electron diffraction thermoelectricity, black body radiation

A2. Contemporary Trends, Problems and Research: Optics of EM waves-applications, polarization, reflection and attenuation of radiation

A3. Professional Responsibility: Writing high quality of technical reports, self-motivated and independent experimentalist and gaining computer skills (generating plots, data analysis)

B. Subject-specific skills

B1. Problem solving skills:
From this course, student can build a critical-thinking skills as a problem solver. Also, student can have an excellent practice, in the way that how to summarize his experimental effort in a technical report and how to establish high standard technical/practical skills. This type of methodology can be helpful for how to get a great success in the carrier as a researcher or in academia or in industry.

B2. Modeling and Design: In this course, the student makes a realistic experimental validation of theoretical models for different phenomena in physics that were already established in literature. So, the student has to run through several steps that includes theory, establishing of the experiment design and carrying out the experiment.

B3. Application of Methods and Tools:. Carrying out different experiments in physics using different techniques and analyzing the results using different types of analytical methods.

C. Critical-Thinking Skills

C1. Analytic skills: Assess
Applying Statistical tools to test results and drawing conclusions.

C2. Strategic Thinking:

Establishing plans designed to achieve maximum useful of advanced experiments.

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

D1. Communication:

Using computer skills for data analysis and summarizing the finalizing the test results in a technical report.

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 the experiments.

Course structures:

Week	Credit Hours	ILOs	Topics	Teaching Procedure	Assessment methods
1	1	A1,B3	**Procedure of writing reports Plots and experimental errors**	Lecture, Oral inquiry	Class participation
2-11	1	A1,B3,C1, C2 and A2	**Carrying out experiments:** Black body radiation, specific charge (e/m), Electron diffraction, Frank Hertz, Thermoelectricity. Solar energy, Hall-Effect, Magnetic field, Microwaves interactions with materials.	Lecturing discussion Lab work demonstration	Work at lab Oral, Homework: text Short-answer questions,
12-13	1	A1,A2, A3, C2,C3, D1 and D2	**Wrapping up**	Lecture, Class discussion about collected reports	Class participation

References:

A. Main Textbook:

"Advanced Physics Lab-1"
Prepared by Physics Department /Zarqa University

B. Supplementary Textbook(s): TD (to be demined)

1- http://demoweb.physics.ucla.edu/content/experiment-2-microwave-optics.
2- http://cas.umkc.edu/physics/kruger/AdvancedPhysicsLab/experiments/microwave.pdf
3- http://lambdasys.com/products/category/6
4- https://sun.iwu.edu/~gspaldin/Expt'lSyl.html

Assessment Methods:

Methods	Grade (%)	Date
Reports	50	
Final-Experimental Test	20	
Final-Writing Test	30	