



**Department of Physics**

**College of Education**

**University of Salahaddin-Erbil**

**Subject: Instrumentation Physics Laboratory**

**Course Book – 4<sup>th</sup> stage – 2<sup>nd</sup> course**

Supervisor's names:

**Dr. Kasim Fawzy Ahmed**

Co-Supervisor's names:

- 1. Dr. Diyar Ali Rasool**
- 2. Mrs. Khadija Najmdeen Abdulla**
- 3. Dr. Kadhim Qasim Jabbar**

**Academic Year: 2023/2024**

Course Objectives:

- 1) Gain experience in setting up and executing an experiment.
  - a. This will be judged from your lab.
- 2) Learn methods of data analysis, particularly experimental uncertainties (“errors”).
  - a. This will be judged from your written report.
- 3) Prepare your sale for and questions about the experiment.
  - a. This will be judged by the supervisor and his assistances.
- 4) Always study some new physics and think about in in your everyday life.
- 5) Design simple experiment without need for AC electric power or advance equipment.

Comments:

This course is very different from most others you have taken. It stresses independent work and motivation. To successfully complete an experiment, it will be necessary to read the relevant materials before you come to the lab. Make a review for all past three years of laboratory study.

**Class hours:**

Laboratory 2 hours according to the groups and the department time table.

**Note:** The supervisor and his assistances are ready to help the student only outside the laboratory hours.

- Lab partners will be assigned before the first lab.
- Although the official lab hours are 2 hours, you should be prepared to work longer hours. You may work in the laboratory after-hours if the

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supervisor gave the permission for that. A lab key will be made available in the Physics Office; it is available only during regular working hours and under the supervisor or one of his assistances as observers.

- Your lab work will be carried out in groups (2-3 student). You must schedule your time so that all group members are present.

### Course materials:

Laboratory notebooks: You will need two laboratory notebooks for recording and analysing data and do not forget to bring your own laboratory XY Data sheet analysis.

Spreadsheets are fine for some analysis and plotting but they can only do simple fitting (linear regression) so they are not adequate for all experiments.

Computer: It is a good idea for each group to have a "standard" RPI laptop computer in the laboratory.

### Report structure:

The student has to write their scientific report (if they ask to) at the end of the experiment and before going out of the laboratory. Each student has to write his own report without sharing it with his group partners except for the data only.

### Grading:

Your course grade will be determined solely by your report and your answers of the supervisor questions. These will be graded as follows:

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Report content: **5 Marks**

In lab questions: **5 Marks**

Activity : **5 Marks**

Theoretical part exam: **15 Marks**

Practical part exam: **5 Marks**

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Total = **35 Marks**

### **Class Time:**

**Sunday: From** 8:30am **To** 2:30pm (3 groups)

**Monday: From** 8:30am **To** 2:30pm (3 groups)

**The following are the laboratory experiments titles:**

#### **Second semester only**

1. Ohm's law.
2. Wheatstone bridge and resistivity.
3. Simple pendulum (Earth's gravitation)
4. Investigation about Sound and its velocity.
5. The density of an object.
6. Focal length of a lens or a mirror.
7. Surface tension of a liquid
8. Specific heat capacity
9. Gas laws apparatus (Boyle's law)

#### **Course Learning Outcomes**

1. Students development conceptual understanding and scientific reasoning skills.
2. Students develop rigorous quantitative understanding of core physical theories.
3. Prepare the student for more practical skills in instrumentation  
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4. Develop the practical skills under any conditions with/without offers of necessary Lab instruments.
5. Multi-Installation for the same Lab instruments according to the lesson goals.
6. Preparing the student to compile ideas for a lesson with what is available from devices, laboratory experiments
7. During the experiment itself, the student can collect data or observations.
8. Preparation the student for the market outcomes of learning methods.
9. The ability of knowing and installing experiment's equipment in logic and educated way according to the learning market's requirements .