# Department of Physics

# College of Science

# University of Salahaddin

# Practical Physics (Electronics Lab.)

## For (general and communication)

**BSc. Degree in General Physics (General Brunch)**

**Academic Year: 2022/2023**

Lecturer: Dr. Lary Hana Slewa Email: lary.slewa@su.edu.krd

# Course Book

| | |
|---|---|
| **1. Course name** | Electronics lab |
| **2. Lecturer in charge** | Dr. Lary Hana Slewa |
| **3. Department/ College** | College of Science, Physics Department |
| **4. Contact** | E-mail: lary.slewa@su.edu.krd |
| **5. Time (in hours) per week** | Theory: 0.0 (Three only)<br>Practical: 3 |
| **6. Office hours** | At least 10 h/week |
| **7. Course code** | SPh |
| **8. Teacher's academic profile** | I studied for an undergraduate degree in Physics science at Salahaddin University-Erbil between the years of 2001- 2005. After graduation in 2005, in the same year, I got a position in Salahaddin University as a laboratory demonstrator (**general physics lab. , optics lab. , Electric lab and Electric measurement lab**). I stayed with the job for more than 9 year. In 2014, I obtained MSc in thin film.<br>3/12/2014 Assistance Lecturer in University of Salahaddin- College of science physics department - Erbil -Iraq<br>**For academic year 2016-2017 I've taught Electronic in Medicine for third year Physics student in** Physic depertment .<br>Finally, I have obtained **PhD. degree** in Solid state (Nanotechnology for biochemical application) from<br>Salahaddin University-Erbil, Kurdistan Region, Iraq, through split site program with Universiti Sains Malaysia. I have published **12 research** papers in scientific journals. I'm interest in nanomaterials fabrication and characterization by using chemical and physical technology, where I have used films in many applications, such as solar cell, gas, optoelectronics, thin film EGFET for pH |

| | |
|---|---|
| | sensors, and multilayer characteristics, etc… |
| **9. Keywords** | N/A |

10. Course overview:

The objective of this course is to teach Electronics by observations from experiments. This approach complements the classroom experience of Physics, where students learn the material from lectures and books designed to teach problem solving skills. Historically, Electronics evolved from many observations that called for a theoretical explanation. This laboratory course is designed to perform experiments showing the validity of theoretical equations.

This laboratory consists of two courses, each course have different experiments explain the concepts of Electronics and will introduce students to the foundations of practical physics experimentally, therefore the course is intended to cover some of the standard concepts in Electronics physics, namely, electrical circuits, resistors combinations and so on.

The course aims to lay the foundational concepts for students who would take up more advanced and specialized topics in later years.

**11. Course objective:**

Student learning outcomes:

- Better understand physics concepts covered in lecture by seeing their application in experiments.
- To understand the importance of experiment as the basis of the scientific method.
- To obtain experience in the techniques employed by scientists in all fields for analysing data and drawing conclusions from "real world" experiments.
- Report there results in a scientific fashion.

**12. Student's obligation**

It is expected that the students interact a lot and ask questions. This will help to be more efficient when conducting the lab and writing the lab report.

For the remaining 3h the students will conduct the experiments and start the data analysis. Students should pay close attention to the instructions of the teacher and the lab

manual. Careful experimenting will result in better data. If something is unclear the teacher is ready to help.

Every lab is 3h long. Students are expected to be on time and they are expected to stay until the end of the lab and to not leave early. If you finish early work on the lab report.

Nobody should leave without the teacher signing your data.

**13. Forms of teaching**

Each student make one experimentally separately and take data then solved mathematically and graphically then compared with theoretical data, after that in next week they make report of their experiment and discussed physically.

**14.Assessment scheme**

In this way every week they make eight experiments for each course. At the end of each course the students are required to do examinations.

There will be final exam on 20 marks so that the final grade will be based upon the following criteria:

Mean of the two exams: 14%, for this lab. Because there are another two lab.(optics and Nuclear Physics)

Final exam: 20%

**15. Student learning outcome:**

Format of Report:
The idea of the report is that you could go back to report in a few months and would be able to repeat the measure ments without any further instructions only using your report.

Start with writing the experiment’s title and your partners' name/s.

Structure:

Objectives:

The purpose of the lab. The objective part should be very short; it should not be longer than two or three lines. Write it in your own words.

Notes:
Write and explain any derivations of formulas you used in this experiments as well as assumptions we made to modify these formulas. (These are not the lecture notes!)

Procedure:
Students may asked to write in their own words each step of your experiment. Do not copy the procedure from the lab manual. Draw a sketch of any apparatus and label the different components used in this experiment.

Data input:
Will include tables, graphs (Before printing any graph ask your TA to check the plot), and charts properly labelled with units. Please tape all extra papers to your notebook. The data should contain the information that was given and measured during the experiment (radii, current, voltage, resistance, etc.).
Write units for all physical quantities. Not using unit's results in a deduction of points for your lab report.

Calculations:
Transform your data into results. Do not erase.
Write the formulas you are going to use in your calculation, explain what that formula for is, and then use it.
Calculate error propagation.
Write unitsfor all physical quantities. Not using units results in a deduction of points for your lab report.
Final Results:
Write all your final results as follows: result ± uncertainty. Every measurement that you take has to be given with an error. Giving a measurement without the uncertainty has no physical meaning. Write units for all physical quantities. Not using units results in a deduction of points for your lab report.

Discussion of errors:
Discuss the systematic and statistical errors involved in your experiment.

## 15. Course Reading List and References:

The main text books are:

1. **Solid State Electronic Devices, By: Ben G. Streetman, 3rd edition, 2014.**
2. **Electronic Device and circuit theory, By R. Boylestand and L. Nashelsky, 7th edition.**

**3. Electronic Devices & Circuits, by Jacob Millman & Christos C. Halkias, 1967.**

| 17. The Topics: | Lecturer's name |
|---|---|
| **Both Courses** | |

**Exp.1 Common base characteristic of a BJT transistor**

| **Both Courses** | |
|---|---|
| **Exp.1 Common base characteristic of a BJT transistor** | |
| **Exp.2 Common Emitter characteristic of a BJT transistor** | |
| **Exp.3 transistor β** | |
| **Exp.4 Bipolar Junction Transistor as current source** | |
| **Exp.5 Design of Voltage Divider Bias Circuit for Common Emitter Amplifier** | |
| **Exp.6 Common Emitter Amplifier** | |
| **Exp.6 Common Emitter Amplifier** | |
| **Exp.8 LC Oscillators** | |
| **Exp.9 MIXER AND RC-FILTER** | |
| **Exp.10 Amplitude Modulation (AM)** | |

| | |
|---|---|
| **Exp.11 A stable Multivibrator** | |
| **Exp.12 JFET characteristic** | |
| **Exp.13 JFET Amplifier** | |
| ***Note:***This syllabus may be subject to changes, i.e. we may take either longer or shorter time to finish a topic, if any changes happened you will be notified well in advance. | |
| **20. Extra notes:** | |
| **21. Peer review** | |