Department of Physics

College of Education

University of Salahalddin - Hawler

Subject: Advanced Electricity and Magnetism Lab

Course Book – (2 Year)

Lecturer's name: Assist.Prof Gulala Mohamud Faraj

Assist.Prof Mohammed Salih Ali

Assistant Lecture Avin Jawhar Ali

Assistant Lecture Khadiga Najmadien

Academic Year: 2022-2023

Course Book

1. Course name	**Advanced Electricity and Magnetism Lab**
2. Lecturer in charge	**Gulala Mohammed Faraj, Mohammed Salih Ali, Avin Jawhar Ali.**
3. Department/ College	**Physics/ College of Education**
4. Contact	**e-mail: gulala. faraj@su.edu.krd 07504493444**
5. Time (in hours) per week	**18 hours/week**
6. Office hours	**Tuesday 8:30am-02:30pm, Wednesday 9am-2pm or by appointment**
7. Course code	
8. Teacher's academic profile	**Undergraduate Study: 1991-1995.** **Physics Assistant: 1995-2002** **MSc Study 2002-present** **lecturer Assistant: 2002-2010** **lecturer: 2010-2017** **Assist prof. :2017-present** **Teaching: practical physics :(electricity lab. +mechanics lab+ atomic lab + advanced electricity and magnetism lab. Electricity lab. General physics lab.** **Theory: Electricity and magnetism (first stage), advanced electricity and magnetism, and, general physics.**

9. Keywords	**Thevenin's Theory, Biot-Savart's law, Phase Shift, Damping Factor, Resonance Circuit, high pass &low pass filter, Power, RLC circuit**

10. Course overview: The students are required to do make experiments weekly during the course, besides other many quizzes (one quiz after finish experiments group). The Project in laboratory has 15 marks, and the quizzes with participates in laboratory discussions count 5 marks. There will be a final exam on 30 marks

11. Course objective: Understanding advanced electricity and magnetism laboratory is both a basic aspect of physics and very important in view of its increasing technological importance. The aim of the course is to develop a sound understanding of the basic concepts of advanced electricity and magnetism laboratory. The course will give the students a better understand of a number of topics, such as the existence of different physical states of matter and the degree to which matter can be stretched and compressed when forces are applied, and other phenomena involving macroscopic properties include the manner in which fluids flow explained using experimental observations and (large-scale) theories. Surface tension in liquids in explained using a molecular level theory

12. Student's obligation: Students are evaluated through exams and reports.

13. Forms of teaching: Different forms of teaching will be used to reach the objectives of the course , power point presentations for the head titles and definitions, and all subjects detail including the equations and some solved problems, also student can get copy of lectures before time of lecture by a few days in order to knowing background and making preparing themselves about the subjects, so that resulting an active way to understanding, beside that the

important notes and complicated equations will explained on white board.

To get the best of course, it is suggested that you attend classes as much as possible, read the required lectures, teacher's notes regularly as all of them are foundations for the course. Lecture's notes are not for supporting and not for submitting the reading material including the handouts. Try as much as possible to participate in classroom discussions, preparing the assignments given in the course.

14. Assessment scheme:
Do Make Experiments Weekly: 15% Quizzes and Laboratory Participation 5% Final Exam: 30%

15. Student learning outcome: The science learning goals of laboratory experiences include enhancing mastery of science subject matter, developing scientific reasoning abilities, increasing understanding of the complexity and ambiguity of empirical work, developing practical skills, increasing understanding of the nature of science, and improving teamwork abilities.
The research suggests that laboratory experiences will be more likely to achieve these goals if they (1) are designed with clear learning outcomes in mind, (2) are thoughtfully sequenced into the flow of classroom science instruction, (3) integrate learning of science content and process, and (4) incorporate ongoing student reflection and discussion..

16. Course Reading List and References: 1-A Text book of Electrical Technology, by B.L THERAJA and A.K.THERAJA, 1st Multicolor Edition 2005.

2-"University Physics", 2008, by Sears and Zemansky's, 12th edition, publishes as Pearson Addison-Wesley, 1301 Sansome

	St., San Francisco, CA 94111. All rights reserved. Manufactured in the United States of America. **The core materials of the course consists of the above book, articles from media and internet, and the lecture's notes, make sure you read all the materials and prepare well before going for the exams.**
17. Practical Topics	**Experiment Group 1** **1: To Verify Thevenin's Theory.** **2: RLC Circuit.** **3: High-Pass and Low-Pass Filters.** **4: Damping Factor in Electric Resonance Circuit.** **5: Investigation of Capacitance and Inductance in A.C Circuits.** **6: Magnetic Field of Single coils Biot-Savart's law.** **7: Resistance, Phase Shift and Power in AC Circuits.** **Experiment Group2** **8- Inductance of Solenoids** **9- The Transformer Efficiency (step up).** **10- The Transformer Efficiency (step down).** **11: Amperes' Law.** **12: Magnetic Hysteresis.** **13: Lissajous Figure.** **14: Magnetic field of paired coils in Helmholtz arrangement**

18. Examinations:

1. <u>Multiple choices:</u>

Example: unit of the magnetic field is(a-Tesla, b-Volt, c-Ohms, d-Amper)

2. <u>Mathematica derivation</u>

Find the resistivity of a metal wire of $2\mathrm{m}$ length and $0.6\mathrm{mm}$ in diameter, if the resistance of the wire is 50Ω ?

3. Complete the following phrases:

Example: low pass filter is----------

4. Drive: In resonance circuit prove that $f_\circ = \frac{1}{2\pi\sqrt{LC}}$ where $f_\circ$ is the resonance frequency, L is the inductance of the coil and C is the capacitance of the capacitor?

19. Extra notes:

20. Peer review

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