Department of Physics

College of Science

Salahaddin University - Erbil

Subject: Thermodynamics Lab.

Medical(I)

Course Book – (2 Year)

Lecturer's name: Dr. Shaida anwer Kakil

Academic Year: 2023/2024

Academic Year: 2022/2023

Course Book

1. Course name	**Thermodynamics Lab.(I)**
2. Lecturer in charge	**Dr. Shaida Anwer Kakil**
3. Department/ College	**Physics / Science**
4. Contact	**e-mail** Shaida.Kakil@su.edu.krd
5. Time (in hours) per week	**Practical: 4**
6. Office hours	**To be Return to the schedule on the office door**
7. Course code	
8. Teacher's academic profile	We are Five teacher were teaching in Thermo laboratory.
9. Keywords	Heat & Thermodynamics, Concepts and Applications Origin of Thermodynamics, Postulate of Thermodynamic

10. Course overview:

Thermodynamics is the science of the conversions between heat and other forms of energy. It experimental science based on small number of principles that are generalization made from experience concerned only with macroscopic properties of matter. Thermodynamics is essential to understand principles behind engines, refrigerators, and even life itself. The course will give students a better understanding of the meaning of Heat and Temperature, be discussing some basic concepts and definitions and considering a scientific look at heat, temperature internal energy and with a description of one of the laws of thermodynamics ("Zeroth law"). We consider the law of conservation of energy as a universal law of nature, and the processes by which end transferred. This laboratory consists of two courses, each course have different experiments explain the concepts of heat and thermodynamic physics and will introduce students to the foundations of heat and law of thermodynamics experimentally, therefore the course is intended to cover some of the standard concepts in heat and thermodynamic physics. Namely, thermal conductivity, thermal expansion, specific heat and change of phase, and etc. 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:

This knowledge will be applied to more advanced and specialized topics to be studied in later years.

12. Student's obligation

To get the best of the course, it is suggested that you attend classes as much as possible for all the material discussed in class. Come to class prepared physically and mentally. Before class, read the required lecture for that day, and then read the material again after class discussion of the topics. Lecture's notes are for supporting and not for submitting the reading material including the handouts. Heat and Thermodynamic physics are best learned by solving problems. It is your responsibility to review the lecture notes and work on the problems at the end of every chapter in

addition to the solved examples. Do not miss class; get notes from someone if you have an unavoidable absence.

13. Forms of teaching

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

14. Assessment scheme

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

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

Mean of the two exams: 13%, for this lab. Because there are another two labs. (Thermodynamics)

Final exam: 20%

15. Student learning outcome:

Upon the successful completion of this course, the student should be able to

- Student learning outcome:
- write down the Newton’s law of cooling applies are those of forced convection, cooling in a drought.
- Measure how the current through an electric light bulb varies as the applied voltage is changed. Calculate the electrical resistance and electrical power for each current/voltage measurement.
- Determine the radiated power and plot a graph of log (radiated power) against log (resistance) to verify Stefan's Law
- Define a "Stefan-Boltzmann’s law" and explain what a Stefan's Law and a black body was trying to accomplish
- Discuss the concept of simultaneity
- Understand the radiate behaviour of black bodies
- Know the mathematical form of the black body
- Know thermal conductivity: Searle’s bar Method for the conductivity of a good conductor
- Explain in your own words what is meant by "good conductor" and "bad conductor"
- State the mathematical equations for thermal expansion in solid and liquid
- Calculate the cubical expansion of water
- Calculate the thermal expansion od solid
- Understand coefficient of thermal conductivity using Lee's Method
- State the specific heat capacity
- Write down the mathematical formula for the specific heat capacity relation between cp & cv

- Calculate and understand the change of state of matter
- Explain what is meant by Seebeck effect

16. Course Reading List and References:

Books: *There are many good introductory texts on Thermodynamics for example:*

1. "Heat And Thermodynamics" 2002, by Brij Lal & N. Subrahmanyam.
2. "Heat Thermodynamics and Statistical Physics". 2000. by S.Chand
3. "Heat And Thermodynamics" ("Seventh Edition"). 1997, by Mark W. Zemansky.& Richard H. Dit
4. "Engineering Thermodynamics". 2010, by Tarik Al-Shemmeri & Ventus Publishing

The core material of the course consists of the above books, lectures notes and articles from internet.

17. The Topics:	Lecturer's name
First Course	

The Ratio of the Principle Specific Heat Capacity of a Gas (CP / CV) by Clement and Desormes Method	**Week 1**
The Specific Heat Capacity of Water by an Electrical Heating Method	**Week2**
Leseli Cub And Blackbody Radiation	**Week3**
Searle's bar Method for the conductivity of a good conductor	**Week4**
The Specific Heat Capacity of solid by an Electrical Heating Method	**Week5**
Determination of Latent heat of fusion	**Week6**
Thermal expansion in solids	**Week7**
The Coefficient of Performance of a Refrigerator	**Week8**
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