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**Physics department**

**College of Education**

**Salahaddin University-Erbil**

**Subject: Properties of Matter**

**Course Book – (First Year Student)**

**Lecturer's name: Twana M. Kak Anwer**

**Academic Year: 2023/2024 (1st Semester)**

Course Book

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| **1. Course name** | Properties of Matter |
| **2. Lecturer in charge** | Twana Mohammed Kak Anwer |
| **3. Department/ College** | **Physics, Education** |
| **4. Contact** | e-mails: twana.anwar1@su.edu.krd |
| **5. Time (in hours) per week** | Theory**: 3 Hours** |
| **6. Office hours** | **Sunday: From**  8.30 To 11.30 |
| **7. Course code** |  |
| **8. Teacher's academic profile:** I was born in Erbil, Kurdistan Region-Iraq, in 1983. I received the B.Sc. degree (First Class) in Physics from Salahaddin University-Erbil, in 2005, the MSc. degree (First Class) in Laser Optics and from Salahaddin University-Erbil, in 2010, and completed the Ph.D. Course in Communications from the University of Salahaddin, College of Science, in 2016. My MSc. research Parametric Study of the Spherically Symmetric Cavity Laser Resonator, I became an assistant physicist with the physics department, where I worked in the Mechanics Lab, Electricity and Magnetism Lab, General Physics Lab, Advanced Electricity and Magnetism Lab, Electronic Lab, Nuclear Lab, Illustration Lab, Computer Skills Lab, Modern Physics Lab, Electricity and Magnetism, Properties of Matter, Advanced Electricity and Magnetism, Computer Skills, Laser Physics, Electronics, and General Mathematics. Shortly after I joined the physics department, I Started my master and then became the decider of the department. Now, I am a lecturer in physics department and have been teaching Electronics, and Properties of Matter in Education, and Electronics Lab in Education. |
| **9. Keywords** |  |
| **10. Course overview:** Understanding properties of matter is both a basic aspect of physics and very important in view of its increasing technological importance. The coverage of properties of matter within the degree programs is spread over a number of modules, this being the first. The aim of this module is to develop a sound understanding of the basic concepts of properties of matter. This is done at two levels. Topics such as elastic properties and hydrostatic properties are explained using experimental observations and macroscopic (large-scale) theories. Surface tension in liquids is explained using a molecular-level theory. This is followed by the microscopic treatment of interatomic interactions, the ground-state electronic structure of atoms, and rotational and vibrational energy levels in molecules. The structure of liquid crystals is discussed in terms of different molecular arrangements. Finally, atomic structure and bonding in crystals with diamond structures and sodium chloride structures is described. |
| **11. Course objective:** Students will be able to: * Describe some aspects of the properties of matter using simple physical concepts;
* Follow without difficulty the contents of the modules Physics of Crystals.

Lectures, problems classes.Students are given some homework (which is not marked), and a few questions to do as a part of the Problem Class (which are marked and discussed in the Problems Class every week).  |
| **12. Student's obligation:** * Students should attend in class to take notes during explanation with the bringing of (at least) two different colour pens.
* Other stationaries during tutorial and exam with a scientific calculator.
* Do not knock the door also he/she should come to class quietly during lecture to avoid cut a lecture and disturbing other students.
* Should listen carefully and respect other students i.e., do not make noise.
* Assignments and report are very important to be pass easy in this course.
* Students can ask at any time in the class by rising their hand or can write a note then ask.
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| **13. Forms of teaching:**  Different forms of the teaching will be used to reach the objectives of the course: Power point presentations for the head titles and definitions and summery of conclusions, to make the students more understandable also I will use whiteboard to solving the problems and deriving equations, besides worksheet will be designed to let the chance for participating on several aspects of the subject in the classroom. There will be classroom discussion and the lecturer will give problem homework to be solved, and different issues discussed throughout the academic year. To get the best of the topic, 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 material. Try as much as possible to participate in classroom discussions, preparing the assignments given the course. |
| **14. Assessment scheme:**  Attaining the **requirements** set to succeed in this study subject requires developing a **mathematical** sense, related to this topic, based on emergent analytical and problem-solving skills and memorizing topics cannot secure success. In this system the **maximum** mark is **(75%)**. The grading system is based on the summation of two categories of **evaluations**: **First**, **(25%)** of the **mark** is based on the **academic** year effort of the student which includes:* **20%** for **two** semester examinations, (**10% X 2)** = **20%**, for each semester **10%**.
* **3%** for quizzes.
* **2%** for solving home works (Question Mark).

 **Second**, **(50%)** of the **mark** is based on **final** examination that is comprehensive for the whole of the study material **reviewed** during the academic **year** and it usually occurs during the month of **June**‌ At the **end** of the **evaluation** process, if the students could not **secure** a minimum of **(50%),** they are given a **chance** to **repeat** the **final** exam in **June** and they should be able by then to **equal** or **exceed** the **(50%)** limit otherwise they will have to **repeat** this **subject** during the **next** academic year if it did not **contradict** with the **administrative** regulations. |
| **15. Student learning outcome:** The due dates for submitting the homework assignments are one week from the date of assignment. No late submission will be accepted.Your problem solutions must include the detailed steps (not just the final answer):(**a**) A diagram, where appropriate,(**b**) Symbolic identification of the given and unknown quantities,(**c**) Identification of the definition, concept, or law used to solve the problem,(**d**) Algebraic solution of the problem.Important - correct final answer without the required steps will not be awarded full marks.Your work must be neat and well organized.Some organizational tips:- Write your name in capital letters, so that you will be credited for your    homework- If you use lined paper, use alternate lines. Otherwise, the work is too    cramped and difficult to read.- Write on one side of the paper only.- Start each problem on a new sheet of paper. This allows you to easily    amend your work and to not get stuck with the need to squeeze lots of    material into a small space. Allow for margins at the top, bottom and    sides of the page.- Number your pages and staple your work together prior to submission.Working in groups is a valuable way to learn physics, but the work you submit for grading must be your own. |
| **16. Course Reading List and References‌:**Required book: * R. K. Shukla and A. Sirivastava. (2006), MECHANICS, New Age International (P) Ltd., Publishers, ISBN (13): 978-81-224-2709-7.
* Serway and Jewett (2008), Principle of Physics, 3rd edition.

**Supplementary Text(s):*** D.S. Mathur. (1970), Elements of [Properties of Matter](http://newton.ex.ac.uk/handbook/09-10/modules/book-list-PHY.html#FLOWERS), S.Chand Co.
* B. Lal and N. Subrahmanyam (2001), Properties of Matter.
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| **17. The Topics:** | Twana Kak Anwer |
| **Chapter One: Elasticity****2 Weeks**  | 1.1 Stress and Strain1.2 Elastic Modulus1.3 Elastic Limits1.4.1 Young’s Modulus ($Y$)1.4.2 Shear Modulus ($S$)1.4.3 Bulk Modulus ($B$)1.5: Work done in Deforming a Body ($W$)1.6 Poisson Ratio (Relation between Elastic Constants) ($v$)1.7 Theoretical Limiting Values of Poisson’s Ratio1.8 Thermal expansion |
| **Chapter Two: Fluid Mechanics****2 Weeks**  | 2.1 Introduction1.3 Pressure in a Fluid1.3.1 Pressure, Depth, and Pascal's Law2.3.2 Absolute Pressure and Gauge Pressure2.4 Buoyant Forces and Archimedes’ Principle |
| **Chapter Three:** **Fluid in Motion****2 Weeks**  | 3.1 Introduction3.2 Equation of Continuity of Flow3.3 Rate of flow3.4 Energy of the Fluid3.5 Bernoulli’s Equation3.6 Bernoulli’s Principle for Gases (Venturimrter)3.7 Torricelli’s Law |
| **Chapter Four:** **Surface Tension and Capillary****2 Weeks**  | 4.1 Definition and Explanation of Surface Tension4.2 Shape of Liquid Meniscus in a Glass Tube4.3 Capillary Action |
| **Chapter Five:** **Viscosity****2 Weeks**  | 5.1 Viscosity of Liquid5.2: Viscosity of Gases5.3 Poiseuille's Method for Coefficient of Viscosity5.4 Reynolds Number |
| **Chapter Six: Transport Phenomena**  **2 Weeks**  | 6.1 Introduction6.2 Diffusion6.3: The Size of Cells and Osmosis6.4 Motion through a Viscous Medium6.5 Sedimentation and Centrifugation |
| **18. Practical Topics (If there is any)** |  |
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| **19. Examinations:** Different types of questions will be provided to the student as an exercise and also in examinations such as given them in the question banks which contain each of the following ones:1. Mathematical **derivation** and **explanation** questions for different subjects in calculus are provided.
2. Mathematical **calculation questions** for different algebraic and analytical calculus subjects also given to them.
3. **Multiple** **choices** questions for every subject that are given in calculus topics are also provided to them.
4. Finally, the **true** and **false** questions are also given to them for several mathematical subjects.

Each of these mentioned question types will be seen clearly in the question banks that are given to the quality assurance committee of our physics department.  |
| **20. Extra notes:** Due to a number of **unforeseen** reasons that may lead to the **shifting** of the academic year **program**, it may be subjected to **modifications**. Also, extra **curriculum** hours may be **needed** to cover all the **topics** mentioned above. The students shall be **notified** of the **changes** if and when they may **occur**. |
| **21. Peer review**  |