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**Department of General Science**

**College of Basic Education**

**Salahaddin University-Erbil**

**Subject: Classical Mechanics**

**Course Book – *First Year-First Semester***

**Lecturer: Dr. Mohammed Azeez Saeed**

**Academic Year: 2022/2023**

**September 2022**

**Course Book**

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| **1. Course name** | **Mechanics** |
| **2. Lecturer in charge** | **Mohammed Azeez Saeed** |
| **3. Department/ College** | **General Science/Basic Education** |
| **4. Contact** | **e-mail: mohammed.aziz@su.edu.krd****Tel: 0750 462 2954** |
| **5. Time (in hours) per week**  |  **Theory: 2 hours /week****Practical: 3 hours/week**  |
| **6. Office hours** | **Sunday and Thursday** |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | **B.Sc. in Physics - Sulaimani University,1977****M.Sc. Meteorology and Climatology- Birmingham University 1980.****Ph. D. Astronomy - Baghdad University,2001.****Teaching and research in the fields Meteorology, Climate , Differential Equations, Heat and thermodynamics, Mathematical Physics , Modern Physics, Solar Radiation and Astronomy for over 40 years. Supervising both M.Sc. and Ph.D. students. Participating in the oral exsaminations of postgraduate students in most of the universities of Kurdistan Region.** |
| **9. Keywords** |  |
| Mechanical Physics is a fundamental branch of the science of Physics. Mechanical Physics gives basic science to the students and researchers from all aspects, especially on Classical Physics, Vectors and Scalar quantities, Kinematic motion and nweton’s laws of Physics. Mechanical Physics collects all the laws and ideas together concerned with the Mechanics and regular motions.Mechanical Physics is an old branch of Physics ended at the 19th century (before 1897).Dear Students;This coursebook outlines very short notes on Mechanical Physics for frst year undergraduate students of the Department of general Science, College of Basic Education, Salahaddin University-Erbil, Kurdistan Region - Iraq. It is only a guideline to more comprehensive knowledge of the Classical physics. It is highly recommended that the student must read more from the textbooks mentioned in the references below, together with other sources in the internet.I wish you a good luck and success. |
| **11. Course objective: Classical mechanics**To Study the concepts of Vector.To Study the basic & concepts of Forces.To Study the concepts of Motion and the Laws of Motion.To Study the concepts of Energy, Work & Power, …To Study the Rotation of a Rigid Objects, …To Study the concepts of Universal Gravitation.To Study the Motion in a Circle.To Study the concepts of Momentum and Collisions,To study the basics of Elasticity and its importance.To study the concepts of bending of beams and its applications.To study the Fluid, Viscosity and Surface tension.To study the Oscillations, Mechanical Waves & Sound. |
| **12. Student's obligation**The students shall participate in discussion of the topics and solving practical examples related to the subjects. The exercises will be given to the students as home works. The students will also be asked to prepare reports on selected topics. لێره‌ مامۆستا به‌رپرسیارێتی قوتابی خوێندکار ڕوونده‌کاته‌وه‌ سه‌باره‌ت به‌ کۆرسه‌که‌ بۆ نموونه‌ ئاماده‌بوونی قوتابیان له‌ وانه‌کاندا، له‌ تاقیکردنه‌وه‌کاندا، راپۆرت و ووتار نووسین... هتد.  |
| **13. Forms of teaching**Data Show power point presentation and the white board. |
| **14. Assessment scheme**Breakdown of overall assessment and examinationSemesters examination ( two examinations in a year, each 20%). |
| **15. Student learning outcome:**This subject is concerned with the basic science of Modern physics. All the theories and laws of modern physics will be outlined during teaching of this subject. |
| **16. Course Reading List and References‌:****References:**1. **Classical Mechanics PLUS,** John R. Taylor**,**ISBN: 9781891389221.
2. Introduction to Classical Mechanics With Problems and Solutions. David Morin. Harvard University, USA.
3. 1000 Solved Problems in Classical Physics. An Exercise Book, Ahmad A. Kamal
4. Solved Problems in Classical mechanics.O.L.Delange & J.Pierrus. Oxford Press.
5. Lecture Notes on Classical mechanics. By Sunil Golwala 2007
6. See also the internet
 |
| **17. The Topics:** | **Lecturer's name** |
| Classical Mechanics**Chapter 1: Vectors** 1. Definition of vectors and scalars, examples
	1. Scalars, addition, subtraction, multiplication and division. Examples
	2. Vector addition and subtraction. Examples
	3. Vector multiplication. Examples
	4. Vector division. Examples
	5. Dot product of vectors. Examples
	6. Cross product of vectors. Examples
	7. Solved problems.

**Chapter 2: Newtons law of Motion**1. Introduction
	1. First law
	2. Second law
	3. Third law
	4. Gravitational law
	5. Newton’s law of cooling
	6. Solved problems

**Chapter 3: Motions**1. Uniform motion
	1. Speed. Examples
	2. Velocity. Examples
	3. Acceleration. Examples
	4. Average speed and average velocity. Examples
	5. Motions on a straight line with constant acceleration
	6. Equations of motion. Examples
	7. Solved problems

**Chapter 4: Projectile Motion**1. Introduction
	1. Horizontal & vertical components of velocity. Examples
	2. Solved problems

**Chapter 5: Momentum & Angular Momentum**1. Introduction
	1. Linear momentum. Examples
	2. Angular momentum. Examples
	3. Solved problems

**Chapter 6: Energy**1. Introduction
	1. Types of Energy. Examples
	2. Sources of energy. Examples
	3. Kinetic energy. Examples
	4. Potential energy. Examples
	5. Total energy. Examples
	6. Work. Examples
	7. Solved problems

**Chapter 7: Oscillations**1. Introduction
	1. Equilibria and oscillation
	2. Simple harmonic oscillation
	3. Coupled harmonic oscillation
	4. Waves. Examples
	5. The wave equation
	6. Phase velocity, group velocity and wave packets
	7. Solved problems

**Chapter 8: Rotational Motion of Rigid Bodies** 1. Introduction
	1. description of rotation
	2. newton’s second law in rotating coordinate system
	3. Applications
	4. Rigid bodies
	5. Basic Formalism
	6. Torque-free motion
	7. Solved problems
 | Mohammed Azeez Saeed |
| **18. Practical Topics (If there is any)** |  |
| No Practice and Experiments. It is a theoretical subject.  |  |
| **19. Examinations:*****1. Compositional:*** In this type of exam the questions usually starts with Explain how, What are the reasons for…?, Why…?, How….?With their typical answersExamples should be provided***2.******True or false type of exams:***In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided***3. Multiple choices:***In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase. Examples should be provided. |
| **20. Extra notes:**Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks. |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ** This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.*(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).*ئه‌م کۆرسبووکه‌ ده‌بێت له‌لایه‌ن هاوه‌ڵێکی ئه‌کادیمیه‌وه‌ سه‌یر بکرێت و ناوه‌ڕۆکی بابه‌ته‌کانی کۆرسه‌که‌ په‌سه‌ند بکات و جه‌ند ووشه‌یه‌ک بنووسێت له‌سه‌ر شیاوی ناوه‌ڕۆکی کۆرسه‌که و واژووی له‌سه‌ر بکات.هاوه‌ڵ ئه‌و که‌سه‌یه‌ که‌ زانیاری هه‌بێت له‌سه‌ر کۆرسه‌که‌ و ده‌بیت پله‌ی زانستی له‌ مامۆستا که‌متر نه‌بێت.‌‌  |

 Dr.Mohammed Azeez Saeed

01.09.2022