هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	Properties of Matter and Heat
Course Code:	**221PHYS**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Jazan University**
Version:	**2022**
Last Revision Date:	**21/12/2022**

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	4				
2. Course type					
a.	University ☐	College ☐	Department☐	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	**Level 4/Year 2**				
4. Course General Description This course provides an introduction to the basic properties of solids and liquids, including some properties of gasses. In addition, we'll take a brief look at surface tension, viscosity, and diffusion. The course covers an introduction of thermal physics, including the study of temperature, heat, and how they affect matter. Within normal temperature ranges, a gas acts like a large collection of non-interacting point particles, called an ideal gas. Such gasses will be studied on either a macroscopic or microscopic scale. Concepts of internal heat, specific heat and latent heat will be introduced. Some of the processes of energy transfer between a system and its surroundings will be discussed.					
5. Pre-requirements for this course (if any): 101PHYS					
6. Co- requirements for this course (if any): NIL					
7. Course Main Objective(s) **This course is designed to provide students with:** - An introduction of states of matter - The concept of Hooke's law and solid deformation - Archimedes' Principle and floating condition - An introduction to fluid dynamics - Introducing some concepts such as surface tension, viscosity, and transport phenomena. - The fundamental of thermometers and the effect of heat on solid and liquid. - Macroscopic and microscopic description of the ideal gas.					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	31	56.4 %
2.	E-learning		
3.	Hybrid ● Traditional classroom ● E-learning	2	3.6 %
4.	Distance learning		
5.	lab work	22	40%

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	33
2.	Laboratory/Studio	22
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	55

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	**Define** states of matter, stress, strain, elasticity modulus, density, specific gravity, pressure, Buoyant force, ideal fluid, surface tension, cohesive and adhesive forces, contact angle , viscosity coefficient, Reynold's number, diffusion and osmosis, ideal gas, Avogadro's number and number of moles, ideal gas law, the internal energy of a monatomic gas, heat, specific heat, calorimeter, latent heat and phase change, thermal conduction and thermal conductivity, thermal convection, and thermal radiation.	PLO 1.1	Lectures and group discussion in the class, E-Learning (Blackboard)	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
1.2	**State** Pascal's principle, Archemides's principle, continuity equation, Bernoulli's equation, Poiseuille's Law, Zeroth law of thermodynamics, and Stefan's law	PLO 1.1	Lectures and group discussion in the class, E-Learning (Blackboard)	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
1.3	**Derive** Describe variation of pressure with depth, pressure measurement devices, motion of fluids, origin of surface tension, capillary action, ideal fluid and viscous fluid flow, transport phenomena: diffusion and osmosis, Fick's law of diffusion, Stoke's law, ideal gas behavior, assumptions of the kinetic theory of gases, principle of calorimetry, heat flow, phase change and latent heat, heat transfer mechanisms, Stefan's law.	PLO 1.1	Lectures and group discussion in the class, E-Learning (Blackboard)	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
2.0	Skills			
2.1	**Derive** the relation between pressure and depth, the continuity and Bernoulli's equations, terminal	PLO2.2	Lectures and group	**Direct** (formative and summative): In

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	speed of a body moving in a viscous medium, and expressions for pressure and temperature of an ideal gas using kinetic theory of gasses.		discussion in the class, E-Learning (Blackboard)	class interactive questioning, quizzes, written exams **Indirect**: student survey
2.2	**Calculate** stress, strain, elasticity modulus, density, specific gravity, pressure inside fluids, variables of hydraulic lifts, buoyant force, continuity and Bernoulli's equation parameters, surface tension, liquid rising in capillary tube, temperatures in different scales, thermal expansion of solids and liquids, ideal gas parameters, internal energy of a monatomic gas, root-mean-square speed of a gas, specific heat, latent heat, rate of energy transfer.	PLO2.1	Lectures and group discussion in the class, E-Learning (Blackboard)	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
2.3	**Perform** laboratory experiments included in this course.	PLO2.3	Audiovisual demonstrations of laboratory equipment and performing actual experiments.	**Direct** (formative and summative): Evaluation of assignments, Step-by-step checkpoint assessment of experiment, In lab interactive questioning, quizzes, written exams **Indirect**: student survey
2.4	**Develop** communication competencies during interactive discussion, group assignments.	PLO 2.4	Interactive discussion- Case study, group project, open discussion - reviews	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
3.0	Values, autonomy, and responsibility			
3.1	**Demonstrate** abilities to work in groups and bear individual		Interactive and Group	**Direct** (formative and

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	responsibility during lab work, interactive discussion and group assignments	PLO 3.1	discussion, expository and discovery teaching	summative): In lab interactive questioning **Indirect**: student survey
3.2	**Show** awareness of safety for own and others when dealing with lab equipment's	PLO 3.3	Case study- interactive demonstration- guided discussion	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey

B. Course Content

Theoretical Part

No	List of Topics	Contact Hours
1.	1. Solids and Fluids: ● States of Matter ● The Deformation of Solids ● Density and Pressure ● Variation of Pressure with Depth ● Pressure Measurements ● Buoyant Forces and Archimedes's Principle ● Fluids in Motion ● Surface Tension, Capillary Action, and Viscous Fluid Flow ● Transport Phenomena	15
2.	2. Thermal Physics: ● Temperature and the Zeroth Law of Thermodynamics ● Thermometers and Temperature Scales ● Thermal Expansion of Solids and Liquids ● Macroscopic Description of an Ideal Gas ● The Kinetic Theory of Gases	9
3.	3. Energy in Thermal Processes: ● Heat and Internal Energy ● Specific Heat ● Calorimetry ● Latent Heat and Phase Change ● Energy Transfer	9
Total		33

Experimental Part:

No	List of Topics	Contact Hours
1.	Determination of the torsion constant of a torsion axle	**2**
2.	Determination of the moment of inertia of bodies using torsion axle.	**2**
3.	Determination of the acceleration due to gravity using the compound pendulum	**2**
4.	Determination of Young's modulus for a wire	**2**
5.	Determination of the speed of sound in Liquids	**2**
6.	Verification of Boyle's law	**2**
7.	Determination of the thermal conductivity coefficient for a solid	**2**
8.	Determination of the linear thermal expansion coefficient of a Solid	**2**
9.	Determination of the specific heat of a solid by the method of mixtures	**2**
10.	Determination of the electrical equivalent of heat	**2**
Total		20

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework assignment 1	3	5
2.	Lecture Quiz 1	5	2.5
3.	Mid-term exam	7	15
4.	Homework assignment 2	9	5
5.	Lecture Quiz 2	10	2.5
6.	Laboratory exam	11	20
7.	Final Exam	12	50

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	College Physics 7th edition, R. A. Serway, J. S. Faughn and C.Vuille, Brooks/Cole Publishing Co. 2005.
Supportive References	1. Physics for Scientists and Engineers with Modern Physics; 7th edition, Serway, Saunders Golden Sunburst Series, 2007 2. Fundamentals of Physics; Halliday, Resnik and Walker , John Wiley and Sons Inc., 2007.
Electronic Materials	http://www.hazemsakeek.com/ http://matweb.com
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	Properties of Matter and Heat Laboratory

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peers, and Program Leader	Indirect (CES)- Indirect peer evaluation
Effectiveness of student's assessment	Students, Program assessment committee	Direct/Indirect
Quality of learning resources	Students, Faculty members	Indirect
The extent to which CLOs have been achieved	Instructor	Direct/Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	**DEPARTMENT BOARD**
REFERENCE NO.	**PHYS2304**
DATE	**28/2/2023**