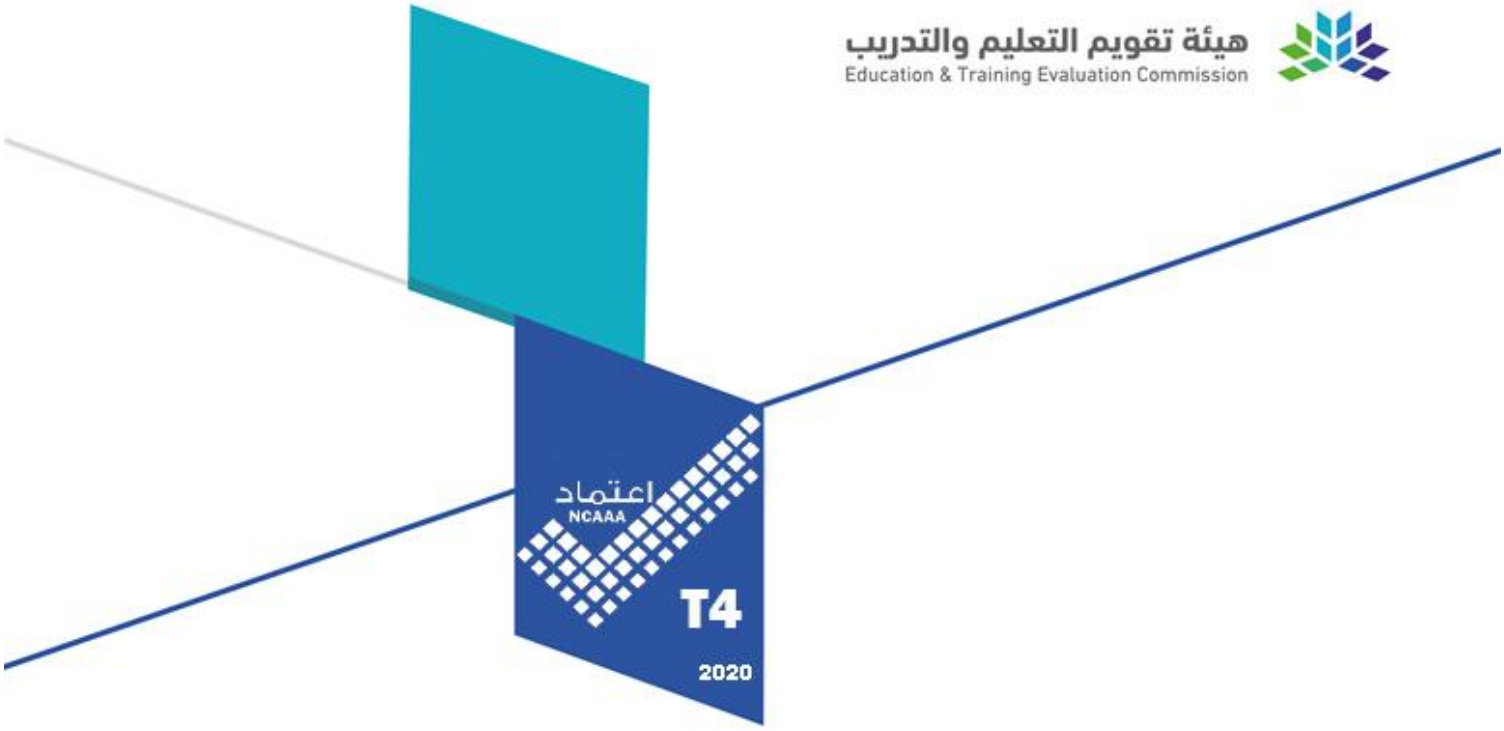
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Properties of Matter and Heat
Course Code:	**221PHYS**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**Jazan University**

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A. Course Identification

1. Credit hours: 4
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level3/Year 2
4. Pre-requisites for this course (if any)**: NIL**
5. Co-requisites for this course (if any)**:NIL**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	**45**	**55%**
2	**Blended**	**6**	**7%**
3	**E-learning**		
4	**Distance learning**		
5	**Other (lab)**	**30**	**37%**

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	**45**
2	**Laboratory/Studio**	**30**
3	**Tutorial**	**--**
4	**Others** (specify)	
	Total	**75**

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides an introduction of basic properties of solids and liquids, including some properties of gases. 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 gases 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.

2. Course Main Objective

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 ideal gas.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**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.	**PLO1.1**
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	**PLO1.1**
1.3	**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.	**PLO1.1**
2	**Skills :**	
2.1	**Derive** the relation between pressure and depth, the continuity and Bernoulli's equations, terminal speed of a body moving in a viscous medium, and expressions for pressure and temperature of an ideal gas using kinetic theory of gases.	**PLO2.2**
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**
2.3	**Perform** laboratory experiments included in this course.	**PLO2.3**
2.4	**Develop** communication competencies during interactive discussion, group assignments.	**PLO 2.4**
3	**Values:**	
3.1	**Demonstrate** abilities to work in groups and bear individual responsibility during lab work, interactive discussion and group assignments	**PLO3.1**
3.2	**Show** awareness of safety for own and others when dealing with lab equipment's	**PLO3.3**

C. 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	**15**
3	**3. Energy in Thermal Processes:** ● Heat and Internal Energy ● Specific Heat ● Calorimetry ● Latent Heat and Phase Change ● Energy Transfer	**12**
Total		**42**

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. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	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.	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	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	**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.	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 speed of a body moving in a viscous medium, and expressions for pressure and temperature of an ideal gas using kinetic theory of gases.	Lectures and group discussion in the class, E-Learning (Blackboard)	**Direct** (formative and summative): In class interactive questioning, quizzes, written exams **Indirect**: student survey
2.2	**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.	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.	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.	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**		
3.1	**Demonstrate** abilities to work in groups and bear individual responsibility during lab work, interactive discussion and group assignments	Interactive and Group discussion, expository and discovery teaching	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey

3.2	**Show** awareness of safety for own and others when dealing with lab equipment's	Case study- interactive demonstration- guided discussion	**Direct** (formative and summative): In lab interactive questioning **Indirect**: student survey
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2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	**Homework assignment 1**	**2**	**5**
2	**Lecture Quiz 1**	**4**	**2**
3	**1st Mid-term exam**	**6**	**8**
4	**Homework assignment 2**	**10**	**5**
5	**Lecture Quiz 2**	**11**	**2**
6	**2nd Mid-term exam**	**12**	**8**
7	**Laboratory exam**	**14**	**20**
8	**Final Exam**	**16**	**50 (50%)**

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
Course Instructor available in the selected office hours for consultations (at least one hour every day).

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	College Physics 7th edition, R. A. Serway, J. S. Faughn and C.Vuille, Brooks/Cole Publishing Co. 2005.
Essential References Materials	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.wikipedia.org/ http://www.hazemsakeek.com/ http://matweb.com
Other Learning Materials	

2. Facilities Required

Item	Resources

Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Class Room
Technology Resources (AV, data show, Smart Board, software, etc.)	Projector
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Properties of Matter and Heat Laboratory

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	Students, Peers and Program Leader	Indirect (CES)- Indirect peer evaluation
Assessment	Students, Program assessment committee	Direct/Indirect
Extent of achievement of course learning outcomes	Instructor	Direct/Indirect
Quality of learning resources	Students, Faculty members	Indirect

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	**Department council**
Reference No.	**8**
Date	**16/4/1442**