



Course Specification

— (Bachelor)

Course Title: **Thermodynamic**

Course Code: **PHYS26251**

Program: **Physics**

Department: **Physics**

College: **Science**

Institution: **University of Bisha**

Version: **3**

Last Revision Date: 25 July 2023



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A. General information about the course:

1. Course Identification

1. Credit hours: 3

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: 4th Level / 2nd year

4. Course general Description

This course directs our attention to the study of heat and temperature, the laws of thermodynamics, and the kinetic theory of gases, heat engines and entropy. Thermodynamics involves situations in which the temperature or state (solid, liquid, gas) of a system changes due to energy transfers. As we shall see, thermodynamics is very successful in explaining the bulk properties of matter and the correlation between these properties and the mechanics of atoms and molecules.

5. Pre-requirements for this course:

NA

6. Co- requirements for this course:

NA

7. Course Main Objective(s)

Recognize the fundamentals of the heat and thermodynamics.

2. Teaching mode

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4.	Distance learning		





3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	45

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 the temperature.	K.1	Lectures Solve problems	Written test Reports Homework Quizzes
1.2	Describe the first law of thermodynamics.	K.1		
1.3	Recognize the kinetic theory of gases.	K.1		
1.4	Describe the heat engines, entropy, and the second law of thermodynamics.	K.1		
2.0	Skills			
2.1	Solve problems related to the temperature.	S.1	Lectures Solve problems.	Written test Reports Homework Quizzes
2.2	Apply the first law in thermodynamics.	S.1		
2.3	Apply the kinetic theory of gases.	S.1		
2.4	Solve problems in the heat engines, entropy, and the second law of thermodynamics.	S.1		
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently.	V.2	Self-learning	Reports Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	Temperature 1. Temperature and the Zeroth Law of Thermodynamics.	4.5



	2. Thermometers and the Celsius Temperature Scale. 3. The Constant-Volume Gas Thermometer and the Absolute Temperature Scale. 4. Thermal Expansion of Solids and Liquids. 5. Macroscopic Description of an Ideal Gas.	
2.	The First Law of Thermodynamics 1. Heat and Internal Energy. 2. Specific Heat and Calorimetry. 3. Latent Heat.	4.5
3.	The First Law of Thermodynamics 4. Work and Heat in Thermodynamic Processes. 5. The First Law of Thermodynamics.	4.5
4.	The First Law of Thermodynamics 6. Some Applications of the First Law of Thermodynamics. 7. Energy Transfer Mechanisms in Thermal Processes.	4.5
5.	The Kinetic Theory of Gases 1. Molecular Model of an Ideal Gas. 2. Molar Specific Heat of an Ideal Gas. 3. The Equipartition of Energy.	4.5
6.	The Kinetic Theory of Gases 4. Adiabatic Processes for an Ideal Gas. 5. Distribution of Molecular Speeds.	4.5
7.	Heat Engines, Entropy, and the Second Law of Thermodynamics 1. Heat Engines and the Second Law of Thermodynamics. 2. Heat Pumps and Refrigerators.	4.5
8.	Heat Engines, Entropy, and the Second Law of Thermodynamics 3. Reversible and Irreversible Processes. 4. The Carnot Engine.	4.5
9.	Heat Engines, Entropy, and the Second Law of Thermodynamics 5. Gasoline and Diesel Engines. 6. Entropy.	4.5
10.	Heat Engines, Entropy, and the Second Law of Thermodynamics 7. Changes in Entropy for Thermodynamic Systems. 8. Entropy and the Second Law.	4.5
Total		45





Table: The matrix of consistency between the content and the learning outcomes of the course.

	Course Learning Outcomes								
	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1
Topic 1	√				√				√
Topic 2		√				√			√
Topic 3		√				√			√
Topic 4		√				√			√
Topic 5			√				√		√
Topic 6			√				√		√
Topic 7				√				√	√
Topic 8				√				√	√
Topic 9				√				√	√
Topic 10				√				√	√

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, quizzes, reports, and presentation.	1: 15	10 %
2.	First term exam	7: 8	20 %
3.	Second term exam	12:13	20 %
4.	Final exam	End of Semester	50 %

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	<ul style="list-style-type: none"> - Physics for Scientists and Engineers, 9th Edition, by Raymond A. Serway, John W. Jewett, BROOKS/COLE CENGAGE Learning, Boston USA, (2019). - Thermodynamics an Engineering Approach, 5th edition, Y. A. Çengel and M. A. Boles McGraw-Hill, (2006).
Supportive References	Fundamentals of Physics Extended, 12th Edition, David Halliday, Robert Resnick, Jearl Walker, Wiley, 2021.
Electronic Materials	<ul style="list-style-type: none"> - Blackboard. - PowerPoint presentations. - Digital library of University of Bisha https://ub.deepknowledge.io/Bisha
Other Learning Materials	NA



2. Required Facilities and equipment

Items	Resources
facilities	Classrooms, Physics lab.
Technology equipment	Data show or smart board.
Other equipment	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Extent of achievement of course learning outcomes.	Teachers, students.	Direct (Final exams), Indirect (Questionnaire).
Effectiveness of teaching.	Teachers, students.	Indirect (Questionnaire)
Effectiveness of assessment.	Teachers, students.	Indirect (Questionnaire)
Quality of learning resources	Teachers, students.	Indirect (Questionnaire)
Quality of facilities available	Teachers, students.	Indirect (Questionnaire)
Fairness of evaluation	Peer reviewer.	Direct (Final exams reevaluation).

G. Specification Approval Data

COUNCIL /COMMITTEE	College of Science Council
REFERENCE NO.	20
DATE	17 August 2023

