هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:	**Statistical Physics**
Course Code:	**PHYS26353**
Program:	**Physics**
Department:	**Physics**
College:	**Science**
Institution:	**University of Bisha**
Version:	**3**
Last Revision Date:	25 July 2023

Table of Contents

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:	6th Level / 3rd year

4. Course general Description
This course aims to give students a deep understanding of the principles of statistical physics and how to apply them to a wide variety of problems, the contents of the course includes the bases of the thermodynamics and Maxwell–Boltzmann, Fermi–Dirac and Bose–Einstein distributions.
5. Pre-requirements for this course:
NA
6. Co- requirements for this course:
NA
7. Course Main Objective(s)
Recognize bases of statistical physics.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%
2.	E-learning		
3.	Hybrid • 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	Recognize the Basic ideas of statistical distribution.	K.1	Lectures Solve problems	Written test Reports Homework Quizzes
1.2	Define the Maxwell–Boltzmann distribution for distinguishable and indistinguishable Particles	K.1		
1.3	Describe the Fermi–Dirac and Bose–Einstein distribution.	K.1		
2.0	Skills			
2.1	Solve problems related to the statistical distribution.	S.1	Lectures Solve problems.	Written test Reports Homework Quizzes
2.2	Apply the Maxwell–Boltzmann distribution for distinguishable and indistinguishable Particles	S.1		
2.3	Apply the Fermi–Dirac and Bose–Einstein distribution.	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.	**Basic ideas** 1. The macrostate 2. Microstates 3. The averaging postulate 4. Distributions	4.5
2.	**Basic ideas** 5. The statistical method 6. A model 7. Statistical entropy and microstates	4.5
3.	**The Statistics of distinguishable particles** 1.The Boltzmann Distribution for Distinguishable Particles 2. Lagrange's Method of Undetermined Multipliers	4.5
4.	**The Statistics of distinguishable particles** 3. The Single-Particle Partition Function. 4. Degeneracy 5. The Partition Function of a System	4.5
5.	**Indistinguishable Particles and Monatomic Ideal Gases** 1. Distinguishable and Indistinguishable States 2. Identical Gas Particles - Counting the States	4.5
6.	**Indistinguishable Particles and Monatomic Ideal Gases** 3. The Partition Function of a Monatomic Ideal Gas 4. Properties of the Monatomic Ideal Gas	4.5
7.	**Diatomic Ideal Gases** 1. Other Degrees of Freedom 2. Rotational Heat Capacities for Diatomic Gases 3. Tile Vibrational Partition Function of a Diatomic gases	4.5
8.	**Maxwell–Boltzmann gases** 1 The validity of the Maxwell–Boltzmann limit 63 2 The Maxwell–Boltzmann distribution of speeds 65 3 The connection to thermodynamic	4.5
9.	**Fermi–Dirac gases** 1. Properties of an ideal Fermi–Dirac gas 2. Application to metals 3. Application to helium-3	4.5
10.	**Bose–Einstein gases** 1. Properties of an ideal Bose–Einstein gas 2. Application to helium-4 3. Phoney bosons 4. A note about cold atoms	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	2.1	2.2	2.3	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	- Statistical mechanics a survival guide, A. M. Glazer, J. S. Wark, Oxford University Press, (2001). - Statistical Physics, Tony Guénault, Publish by Springer, (2007).
Supportive References	- Fundamentals of Statistical and Thermal Physics, F. Reif, 6th Ed., Waveland Pr Inc., (2008).
Electronic Materials	- 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**