



Course Specification

— (Bachelor)

Course Title: Statistical Physics
Course Code: 2033204-3
Program: BSc. of Physics
Department: Department of Physics
College: College of Science
Institution: Taif University
Version: 2023
Last Revision Date: <i>Pick Revision Date.</i>



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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: (6th Level/ 3th Year)

4. Course general Description:

This course meets 3 times per week 2 for lecture and 1 for Lab. This course develops concepts in classical laws of thermodynamics, mainly for systems in thermal equilibrium. and some important applications. The course discusses how probability theory can be used to derive relations between the microscopic and macroscopic properties of matter. Numerous examples are used to illustrate a wide variety of physical phenomena such as thermodynamic potentials magnetism, ideal gas, thermal radiation, electrons in solids.

5. Pre-requirements for this course (if any):

Heat and Thermodynamic 2032101-3

6. Co-requisites for this course (if any):

NON

7. Course Main Objective(s):

Studying of the physical properties of systems consisting of a very large number particles (atoms, molecules....). Examine the basic theories of statistical physics and apply them to a wide variety of interesting problems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45 (3h per week)	100%
2	E-learning	0	0%
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 	0	0%
4	Distance learning	0	0%





3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (specify)	0
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 principals and scientific facts that are used during the course	K2	Lecture	Written exam and Homework reports
1.2	Report how to manipulate classical and quantum models using statistical physics rules	K2	Lecture and Group discussion	Written exam
...				
2.0	Skills			
2.1	Simplify problems and analyze phenomena	S1	Lectures	Written exam and Homework reports
2.2	Apply the theory on different types of gases: ideal classic, diatomic, quantum Fermi gases such as quarks, electrons Bose gases such as photons	S3	Lecture and Group discussion	Homework reports
...				





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Show responsibility for working independently and for continuous improvement of personal capacities.	V1	Group discussion	Homework reports
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction <ul style="list-style-type: none"> The scope of statistical physics The first, second, and third laws of thermodynamics Thermodynamics potentials The thermodynamic properties of a system	6
2.	Introduction to probability <ul style="list-style-type: none"> Probability distribution of microstates in thermal equilibrium The thermodynamic probability From Microscopic To Macroscopic Behavior	6
3	Maxwell- Boltzmann statistics: <ul style="list-style-type: none"> Distinguishable & indistinguishable particles The statistical interpretation of entropy 	6
4	Partition Function and the Applications <ul style="list-style-type: none"> The monoatomic ideal gas The principle of equipartition of energy	6
5	Maxwell Velocity Distribution The distribution of molecular velocity	3
6	3- Bose- Einstein statistics: <ul style="list-style-type: none"> Bose- Einstein gas Thermodynamic probability in Bose- Einstein Black Body Radiation	6
7	4- Fermi- Dirac statistics: <ul style="list-style-type: none"> Fermi gas Thermodynamic probability in Fermi- Dirac statistics Thermionic emission	6





8	The specific heat capacity of solids <ul style="list-style-type: none"> • Classical Model • Einstein's Model Debye's Model	3
9	Final Review	3
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Activities	continuous	20%
2.	First periodical exam	7 th	15%
3.	Second periodical exam	12 th	15%
4.	Final exam	16 th	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	1- Thermodynamic and statistical mechanics By: G Socrates , Butterworths 1971. 2- Statistical Mechanics, 3 rd Ed., by Pathria and Beale 2011 Elsevier Ltd.
Supportive References	1- Huang, Kerson. <i>Statistical Mechanics</i> . Wiley, 1987. ISBN: 9780471815181. 2- Kardar, Mehran. <i>Statistical Physics of Particles</i> . Cambridge University Press, 2007. ISBN: 9780521873420.
Electronic Materials	https://en.wikipedia.org/wiki/Statistical_physics
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with max 30 seats
Technology equipment (projector, smart board, software)	data show, Smart Board





Items	Resources
Other equipment (depending on the nature of the specialty)	NON

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Department	Indirect
Effectiveness of Students assessment	Students	Indirect
Quality of learning resources	Faculty	Direct
The extent to which CLOs have been achieved	Program leaders	Direct
Improvement of Teaching	Program leaders	Direct

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PHYSICS DEPARTMENT COUNCIL
REFERENCE NO.	NO. 4-45
DATE	27/09/2023 (12/03/1445)

