مركز الاعتماد وضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER

Course Syllabus

1	**Course title**	Thermal Physics
2	**Course number**	0332341
3	**Credit hours**	3
	Contact hours (theory, practical)	3 Theory
4	**Prerequisites/Co-requisites**	0302261
5	**Program title**	Physics
6	**Program code**	0302
7	**Awarding institution**	The University of Jordan
8	**School**	Science
9	**Department**	Physics
10	**Course level**	3rd year
11	**Year of study and semester(s)**	1st Semester 2022/2023
12	**Other department(s) involved in teaching the course**	none
13	**Main teaching language**	English
14	**Delivery method**	☒Face to face learning ☐Blended ☐Fully online
15	**Online Platforms(s)**	☒Moodle ☒Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	November 7 2022

17 Course Coordinator:

Name: *Prof. Hassan Juwhari*

Contact hours:

10:00 am -11:30 am Monday Wednesday & 10:30 am -11:30 am Sunday Tuesday Thursday

Office number: *Physics 203*

Phone number: *Ext: 22062*

Email: *h.juwhari@ju.edu.jo*

18 Other instructors:

Name:

Office number:

Phone number:

Email:

Contact hours:

Name:

Office number:

Phone number:

Email:

Contact hours:

19 Course Description:

As stated in the approved study plan.

Binary Model System; Entropy; Temperature; Thermal Equilibrium; Laws Of Thermodynamics; Boltzmann Distribution; Thermal Radiation; Chemical Potential; Gibbs Distribution; Ideal Gas; Fermi-Dirac And Bose-Einstein Distributions; Thermodynamic Functions; Heat And Work; Heat Engines; Phase Transformations; Van Der Waals' Equation Of State; Kinetic Theory.

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20 Course aims and outcomes:

A- Aims: *This introductory course aims at giving the physics students the basics of Thermal Physics.*

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

SLOs / SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)
1	Introduce the basic postulates of Statistical Mechanics and apply them to basic model systems.			
2	Introduce the concepts of Temperature and Entropy.			
3	Derive the Boltzmann and Gibbs Distributions for classical and quantum mechanical systems.			
4	Calculate the average occupation of the energy states of a large collection of non-interacting atoms			
5	Use the techniques of statistical mechanics and thermodynamics to solve problems.			

6	Describe the thermal properties (e.g. specific heat and distribution functions) of generic materials (e.g. insulators, metals, paramagnets, and Fermi and Bose systems) based on simple models of their basic constituents.			
7	Introduce some thermodynamic functions such as Free Energy and Chemical Potential.			
8	Explain thermodynamic concepts, including the ideas of reversibility, thermal equilibrium under various conditions and entropy.			
9	Explain the concepts of statistical mechanics.			

21. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1		Binary Model System; Average Values	1,	Face-to-Face				
2		Fundamental Assumption; Probability; Thermal Equilibrium; Temperature; Entropy; Laws of Thermodynamics	1,2,4	Face-to-Face				
3		Boltzmann Factor; Pressure; Helmholtz Free Energy; Ideal Gas: A First Look	1,3,4,5	Face-to-Face				
4		Fermi-Dirac Distribution Function; Bose-Einstein Distribution Function;	1,6	Face-to-face				

		Classical Limit						
5		Planck Distribution Function; Plank Law and Stefan-Boltzmann Law; Phonons in Solids: Debye Theory	1,5,6	Face-to-face				
6		Definition of Chemical Potential; Gibbs Factor and Gibbs Sum	1,7	Face-to-face				
7		Ideal Gas	1,2,8	Face-to-face				
8		Fermi and Bose Gases	1,6	Face-to-face				
9		Heat & Work	1,8	Face-to-face				

22 Evaluation Methods:

Home works+ Quiz + Assay + Exams

23 Course Requirements

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(e.g: Each student must have access to a computer, internet connection, account on a specific software/platform:

24 Course Policies:

A- Attendance policies: *No more than 20% of classes can be missed.*

B- Absences from exams and submitting assignments on time*: Only students with acceptable excuses will be eligible for a makeup exam or late assignment submission.*

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior: *We all follow an honor system during the whole course. All the universities laws will be applied to rules breakers.*

E- Grading policy: *The course grading follows the guidelines of the graduate school.*

20% Assignments and Assay + 30% midterm Exam (Best out of two) + 50% Final Exam

F- Available university services that support achievement in the course:

Library + Computer Facilities

25 References:

A- Required book(s), assigned reading and audio-visuals:

"Thermal Physics" by **Charles Kittel & Herbert Kromer** (2^{2d} edition or any newer one)

B- Recommended books, materials, and media:

C**ollections of references** introduced by the authors at the introduction of their textbook including those for various subjects on **Thermodynamics**, **Statistical Mechanics**, **Kinetic theory**, **Phase transitions**, and **Solid State Physics**

26 Additional information:

Name of Course Coordinator: *Dr. Hassan K. Juwhari* Signature: hkj Date: Nov. 7th 2022-------…….

Head of Curriculum Committee/Department: ---------- Signature: ---------- ------….
Head of Department: ---------- Signature: ---------- -------….
Head of Curriculum Committee/Faculty: ---------- Signature: ---------- ..
Dean: ---------- Signature: ----------