



The Hashemite University
Faculty of Science
Department of Physics

Course Title:	Statistical Mechanics	Course Number:	110102442
Semester:	Spring	Year:	2018/2019
Designation:	Compulsory	Prerequisite(s):	110102341 and 110102364
Instructor:	Dr. Gassem Alzoubi	Instructor's e-mail:	gassem@hu.edu.jo
Office Hours:	Sunday, Tuesday, and Thursday, 10:00 –11:00 Am, Physics Building, Room # 107	Webpage:	http://staff.hu.edu.jo/gassem

Course Description (catalog): This course introduces students to several topics in statistical thermodynamics and statistical mechanics. Topics covered in this course include Basic Concepts in statistical thermodynamics, the Statistical Approach and Boltzmann Statistics, the Canonical Ensemble, the Grand Canonical Ensemble, Quantum Statistics and Quantum Ensembles, the Fermi Gas, the Bose Gas, and the Bose-Einstein Condensation

Textbook(s) and/or Other Supplementary Materials:

Textbook: Introduction to Statistical Physics, Second Edition by Kerson Huang, Chapman and Hall, 2010

References:

- (1) Statistical Mechanics, Second edition by Kerson Huang (Wiley, 1987),
- (2) Concepts In Thermal Physics, Second, by Stephen J. & Katherine M. Blundell, Oxford University Press, 2010

Major Topics Covered:

Topics	No. of Weeks	Contact hours*	Chapter in Text	Sections	Suggested Problems (from textbook 9 th edition)
Basic Concepts in Thermodynamics	3	9	1-3	All sections	Ch 1: 1,2,3,4,5,6,7 Ch 2: 1.2,3,5,6,7,8,9,10,11 Ch 3: 1,2,3 4,6,7,8,9
The Statistical Approach and Boltzmann Statistics	3	9	5-6	All sections, except 5.2	Ch 5 : 1,2,3,4,6,7,8 Ch 6: 1,2,3,4,6,9
The Canonical Ensemble	1.5	4.5	8	All sections	Ch 8: 1, 7
First Exam					
The Grand Canonical Ensemble	1.5	4.5	9	All sections, except 9.7	Ch 9: 1, 2
Quantum Statistics and Quantum Ensembles:	3	9	14-15	All sections, except 15.6	Ch 14: 1,2,3,4,5,6,7 Ch 15: 1,2,4,6,7
Second Exam					
The Fermi Gas	1	3	16	All sections, except 16.7	Ch 16: 1,2,3,4,7,8
The Bose gas	1	3	17	All sections	Ch 17: 3,4,5,6,7,8,10,11
Bose-Einstein Condensation	1	3	18	All sections	Ch 18: will be updated later
Final Exam					
Total	15	45			

*Contact hours include lectures and exams

Specific Outcomes of Instruction (Course Learning Outcomes):

After completing the course, the student will be able to:

Course Learning Outcomes (CLO)		(SO*)
CLO1.	Develop a clear understanding of basic physical concepts in statistical thermodynamics and statistical mechanics as an integral part of the student's overall education	(a), (k), (i)
CLO2.	Use algebra, trigonometry, basic calculus, and rules of vector analysis in solving problems in statistical thermodynamics and statistical mechanics	(a), (k)
CLO3.	Provide detailed and accurate descriptions of laws of thermodynamics, Boltzmann distribution, classical and quantum ensembles, Fermi and Bose statistics, and the Bose-Einstein Condensation.	(a), (e) (k)

(SO*) = Student Outcomes Addressed by the Course.

Student Outcomes (SO) Addressed by the Course:

#	Outcomes Description	Contribution
	Applied and Natural Sciences Student Outcomes	
(a)	an ability to apply knowledge of mathematics, science, and applied sciences	H
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to formulate or design a system, process or program to meet desired needs	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify and solve applied sciences problems	L
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of solutions in a global and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.	M
H = High, M = Medium, L = Low		

Grading Plan:	1 st Exam	30 Points	TBA
	2nd Exam	30 Points	TBA
	Final exam	40 Points	TBA

General Notes: **Attendance Policy:** students are expected to attend every class and arrive on time in compliance with HU regulations. In case you find yourself in a situation that prevents you from attending class or exam, you have to inform your instructor. If you miss more than 6 classes for the (Sunday, Tuesday, and Thursday model) or 4 classes for the (Monday and Wednesday Model), you cannot pass the course. Makeup excuses will be accepted only for very limited justified cases, such as illness and emergencies.

Prepared by: Dr. Gassem Alzoubi

Date: Jan, 13, 2019