AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Statistical Physics and Thermodynamics								
Course Code	FZK501		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	6	Workload	150 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The aim of this lecture is to understand the fundamental quantity of thermodynamics and statistical physics which in different ways describe systems with a large number of particles. The systems can be e.g. atoms and molecules in gases, liquids and solids or electrons in metals and semiconductors.								
Course Content	Principles of Thermodynamics; Statistical Approach; Microcanonical Ensemble; Canonical Ensemble; Statistical Mechanics of Gases; Quantum Statistical Mechanics; Fermi-Dirac Statistics; Bose-Einstein Statistics								
Work Placement									
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	30
Quiz	1	8
Attending Lectures	14	28
Assignment	14	14

Recommended or Required Reading	
1	Thermodynamics and Statistical Mechanics - W. Greiner, L. Neise, H. Stöcker
2	Statistical Mechanics - R.K. Pathria
3	Statistical Mechanics - Kerson Huang

Week	Weekly Detailed Course Contents	
1	Theoretical	Equilibrium and state quantities
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p3-25).
2	Theoretical	The laws of thermodynamics
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p33-45).
3	Theoretical	Some applications of thermodynamics
	Preparation Work	K. Huang, (1987). Statical Mechanics. Canada: John Wiley& Sons Inc. (p31-48)
4	Theoretical	Phase transitions and chemical reactions
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p62-80).
5	Theoretical	Kinetic theory
	Preparation Work	K. Huang, (1987). Statical Mechanics. Canada: John Wiley& Sons Inc. (p52-65)
6	Theoretical	Boltzmann’s H theorem and the Maxwell Boltzmann distribution
	Preparation Work	K. Huang, (1987). Statical Mechanics. Canada: John Wiley& Sons Inc. (p73-99)
7	Theoretical	Thermodynamic potentials
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p84-118).
8	Intermediate Exam	Midterm Exam
9	Theoretical	Conduction concept
	Preparation Work	K. Huang, (1987). Statical Mechanics. Canada: John Wiley& Sons Inc. (p93-104)
10	Theoretical	Number of microstates and entropy
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p123-135).
11	Theoretical	Ensemble theory and microcanonical ensemble

11	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p142-150).
12	Theoretical	Canonical ensemble
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p159-200).
13	Theoretical	Applications of Boltzmann statistics
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p208-234).
14	Theoretical	Macrocanonical ensemble
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p240-248).
15	Theoretical	Application of macrocanonical ensemble
	Preparation Work	W. Greiner, L. Neise, H. Stöcker and D. Rischke, (1995). Thermodynamics and Statistical Mechanics. Heidelberg: Springer Verlag (p297-314).
16	Final Exam	Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	0	3	42
Assignment	12	3	1	48
Quiz	4	2	2	16
Midterm Examination	1	10	5	15
Final Examination	1	24	5	29
			Total Workload (Hours)	150
			[Total Workload (Hours) / 25*] = **ECTS**	6

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	After completion of the course student should be familiar with the relation between the phenomenological thermodynamics and the microscopic description in statistical physics.
2	To be able to independently treat problems in thermodynamics and statistical physics.
3	To be able to develop, applications in physics and other natural sciences based on thermodynamic and statistical physical principles.
4	To be able to discuss different classical and quantum ensembles
5	To be able to solve the statistical mechanics problems using ensemble theory
6	To be able to discuss the various classical ensembles and quantum ensembles

Programme Outcomes *(Physics Master)*

1	The student should conceive the concepts in physics and may apply them on her/his own
2	The student should be able to conceive the relationship between the different physics laws and integrity of them and apply them in solving different physics problems
3	The student should know the basic principles of classical, quantum and relativistic physics and use them in the solutions of problems
4	The student should be able to do research in a specific area of physics
5	The student should be able to prepare reports on papers on the subject of her/his research and present her/his research subject in scientific conferences
6	The student should be able to explain the relationship between complicated problems and basic physics laws.
7	The student should be able to use computers for solving complicated physics problems
8	The student should be able to interrelate between the theory and the experiment. If she/he is experimentalist he/she has to explain the theory behind her/his work. If she /he is a theorist she/he should has to know the experiments in her/his subject.

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5	L6
P1	5	5	5	5	5	5
P2	5	5	5	5	5	5
P3	5	5	5	5	5	5
P4	5	5	5	5	5	5
P5	3	3	3	3	3	3

P6	4	4	4	4	4	4
P7	2	5	3	5	3	5
P8	3	4	4	4	4	4