AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Advanced Topics in Statistical Physics								
Course Code	FİZ334		Couse Level	First Cycle (Bachelor's Degree)					
ECTS Credit	6	Workload	156 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The main aim of the course is to teach how to investigate microscopic and macroscopic cases with the concepts of statistical mechanics, and to introduce their possible relations.								
Course Content	Quantum Structure, Fermi-Dirac statistics, Bose-Einstein statistics								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	70
Quiz	6	10
Assignment	6	10

Recommended or Required Reading	
1	Reif, F., Çeviri: Elerman, Y. &Durlu, T.N. (1965). İstatistik Fizik (Berkeley Fizik Serisi, cilt 5). İstanbul: Bilim Yayınları,
2	Apaydin, F. (2004). İstatistik Fizik, Ankara: Hacettepe Üniversitesi Yayınları.
3	Karaoğlu, B. (2003). İstatistik Mekaniğe Giriş. İstanbul: Seyir yayıncılık.
4	Mandel, F. (1971). Statistical Physics, London: John Wiley and Sons Ltd. Statistical Mechanics, Wiley-VCH.

Week	Weekly Detailed Course Contents	
1	Theoretical	Quantum Statistical Mechanics
2	Theoretical	Features of Quantum Structure
3	Theoretical	Grand Canonical Ensemble
4	Theoretical	Number of occupancy formalism
5	Theoretical	Fermi-Dirac Statistics
6	Intermediate Exam	Midterm Exam
7	Theoretical	Fermi-Dirac Statistics
8	Theoretical	General Features of Fermi Gas
9	Theoretical	Electronic Specific Heat of Metals
10	Theoretical	Electron-hole structure of pure semiconductors
11	Theoretical	Bose-Einstein Statistics
12	Theoretical	Bose-Einstein Statistics
13	Theoretical	Photon Gas
14	Theoretical	Black-Body Radiation
15	Theoretical	Bose-Einstein Condensation
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	2	3	70
Assignment	6	3	1	24
Quiz	6	3	1	24
Midterm Examination	1	17	1.5	18.5

Final Examination	1	18	1.5	19.5
			Total Workload (Hours)	156
			[Total Workload (Hours) / 25*] = **ECTS**	6
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	To gain information about Quantum Statistical Mechanics
2	To learn features of Quantum Structure
3	To learn features of Fermi-Dirac statistics
4	To learn features of Bose-Einstein statistics
5	To learn and apply the kinetic theory of gases
6	To learn and apply entropy in thermodynamic

Programme Outcomes *(Physics)*	
1	To understand the importance of physics by understanding the general concepts of physics, matter and energy
2	To be able to define the movements of matter and to distinguish the characteristics of movements under different force (potential)
3	Be able to say the meaning of Lagrange and Hamiltonian formulations of the movement and apply them to simple problems,
4	To be able to express the fundamental concepts such as time, space, force, momentum and energy in the movements of matter close to the speed of light and be able to solve and interpret the simple problems related to
5	To be able to establish the relationship between electric and magnetic forces and to be able to illustrate their applications to technology and solve problems related to the movement of particles in electric and magnetic fields
6	Be able to say the basic laws of electromagnetics and apply them to problems, illustrate their applications to simple technology
7	To be able to tell the reasons of the differences between the classical cases and the quantum scale and explain the reasons
8	Explain the concepts of discontinuity, uncertainty, matter-antimatter, indecisiveness of quantum physics with examples and explain simple problems related to the subject.
9	To be able to solve the problems of micro-particles under different simple potentials and be able to say their meanings
10	To be able to establish the relationship between the movements and properties of multi-particle systems and the laws of probability and solve simple problems
11	To be able to illustrate the laws, meanings and applications of thermodynamics and use them
12	Be able to use their knowledge about quantum physics and mechanics in explaining some properties of atoms and nuclei
13	To be able to show the meanings of some theoretical concepts by experimenting, and develop a strong relationship between thought and the real world, develop analytical thinking
14	To be able to apply the meanings of the basic laws of physics, their comprehension of universality and the relations between them and the unity of the laws of nature.
15	Use computer to solve physics problems
16	To be able to understand the problems by using their analytical knowledge skills and to propose solutions by dealing with the laws of physics
17	Be able to use the knowledge of physics to understand new technologies
18	To be able to tell the relations between symmetry and conservation laws in laws of physics

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

	L3	L4	L5	L6
P13	5	5	5	5