# AYDIN ADNAN MENDERES UNIVERSITY
# COURSE INFORMATION FORM

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Title | Statistical Physics | | | | | | | | |
| Course Code | FİZ324 | | | Couse Level | | First Cycle (Bachelor's Degree) | | | |
| ECTS Credit | 8 | Workload | 198 *(Hours)* | Theory | 4 | 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 physics, and to introduce their possible relations. | | | | | | | | |
| Course Content | identical particles, ensemble theory | | | | | | | | |
| Work Placement | N/A | | | | | | | | |
| Planned Learning Activities and Teaching Methods | Explanation (Presentation) | | | | | | | | |
| Name of Lecturer(s) | Prof. Cesur EKİZ | | | | | | | | |

| Assessment Methods and Criteria | | |
|---|---|---|
| Method | Quantity | Percentage (%) |
| Midterm Examination | 1 | 20 |
| Final Examination | 1 | 70 |
| Quiz | 10 | 10 |
| Seminar | 1 | 10 |

| Recommended or Required Reading | |
|---|---|
| 1 | 1) Reif, F., Çeviri: Elerman, Y. &Durlu, T.N. (1965). İstatistik Fizik (Berkeley Fizik Serisi, cilt 5). İstanbul: Bilim Yayınları, |
| 2 | Karaoğlu, B. (2003). İstatistik Mekaniğe Giriş. İstanbul: Seyir yayıncılık |
| 3 | Apaydin, F. (2004). İstatistik Fizik, Ankara: Hacettepe Üniversitesi Yayınları. |
| 4 | Stauffer, D. (2000) Principles of Equilibrium Statistical Mechanics, Wiley-VCH |

| Week | Weekly Detailed Course Contents | |
|---|---|---|
| 1 | Theoretical | Characteristic Features of Macroscopic Systems |
| 2 | Theoretical | Properties of the Equilibrium Situation |
| 3 | Theoretical | Basic Probability Concepts |
| 4 | Theoretical | Statistical Description of Systems of Particles |
| 5 | Theoretical | Simple interactions among Macroscopic Systems |
| 6 | Intermediate Exam | Midterm exm |
| 7 | Theoretical | Thermal Interaction and Temperature |
| 8 | Theoretical | System in Contact with a Heat Reservoir and Canonic Ensemble |
| 9 | Theoretical | Paramagnetism |
| 10 | Theoretical | Mean values in Canonical Ensemble |
| 11 | Theoretical | Microscopic theory and Macroscopic Measurements |
| 12 | Theoretical | Canonical Distribution in the Classical Approximation and Maxwell Distribution |
| 13 | Theoretical | The Discussion of the Thermodynamics laws |
| 14 | Theoretical | The Equipartition Theorem |
| 15 | Theoretical | Applications of the Equipartition Theorem |

| Workload Calculation | | | | |
|---|---|---|---|---|
| Activity | Quantity | Preparation | Duration | Total Workload |
| Lecture - Theory | 14 | 4 | 4 | 112 |
| Seminar | 4 | 3 | 1 | 16 |
| Quiz | 4 | 1 | 0.5 | 6 |
| Midterm Examination | 1 | 30 | 2 | 32 |

| | | | | |
|---|---|---|---|---|
| Final Examination | 1 | 30 | 2 | 32 |
| | | | Total Workload (Hours) | 198 |
| | | | [Total Workload (Hours) / 25*] = **ECTS** | 8 |
| **25 hour workload is accepted as 1 ECTS* | | | | |

| **Learning Outcomes** | |
|---|---|
| 1 | Gain knowledge of probability |
| 2 | Investigate reasons of macro cases in the micro structure of matter |
| 3 | Identify, formulate, and solve field related problems |
| 4 | 4. Interdisciplinary knowledge association and application. |
| 5 | The students be able to solve and understand problems in relation with statistical physics |
| 6 | Gain knowledge of contemporary issues |

| **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*

| | L1 | L2 | L3 | L4 | L5 | L6 |
|---|---|---|---|---|---|---|
| P1 | 4 | | 4 | 4 | | |
| P2 | 4 | 4 | | 4 | 4 | |
| P9 | 4 | | 4 | | | 4 |
| P10 | 5 | 4 | | | 4 | 4 |
| P11 | 4 | | | 4 | | 5 |
| P14 | 4 | 4 | 4 | | 4 | |
| P16 | 4 | | 4 | 4 | 4 | 4 |
| P17 | 4 | 4 | 4 | 4 | | |