**ESOGU AERONAUTICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| **ENGİNEERİNG THERMODYNAMİCS** | 152414002 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 4 | 3 | 0 | 5 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | X |  |  |  |

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| **Course Language** | **Course Level** | **Course Type** |
| English | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | To give students detailed knowledge of basic thermodynamic principles and their applications, the importance of heat and work, heat engines, refrigeration systems, heat pump systems, cycles, power generation systems and major components used in these systems and their analyses, and give basic information about losses and  efficiencies. |
| **Short Course Content** | Basic concepts of thermodynamics, Pure substance, the first law of thermodynamics  for closed systems and control volumes, Carnot cycle and the second law of thermodynamics. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Capable to know the basic concepts of Thermodynamics. |  |  |  |
| **2** | Recognizes the phases of pure substances, phase-change processes and property diagrams for phase-change processes. |  |  |  |
| **3** | Manages the use of thermodynamic property tables. |  |  |  |
| **4** | Applies the first law of thermodynamics to closed systems and control volumes |  |  |  |
| **5** | Calculates the thermal efficiencies and coefficients of performance of heat engines, refrigerators and heat pumps |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Yunus Ali Çengel and Michael A. Boles, “ Thermodynamics: An Engineering Approach ”, Seventh Edition, McGraw-Hill Book Company, 2011. |
| **Supporting References** | Aksel Öztürk ve Abdurrahman Kılıç, “ Termodinamik Problemler ”, Seç Kitap Dağıtımı, 1987.  Claus Borgnakke and Richard E. Sonntag, “Thermodynamic and Transport Properties”, John Wiley & Sons, Inc., 1997. |
| **Necessary Course Material** | - |

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| **Course Schedule** | |
| 1 | Introduction to Engineering Thermodynamics – I. Basic Concepts of Thermodynamics. |
| 2 | Pure substance, its phases, phase change processes, property diagrams |
| 3 | Property tables, the ideal-gas equation of state, compressibility factor. |
| 4 | Heat, work, the first law of Thermodynamics for closed systems. |
| 5 | The internal energy, enthalpy, and specific heats of ideal gases |
| 6 | The first law of Thermodynamics for control volumes , steady-flow engineering devices. |
| 7 | Transient control volumes |
| 8 | Mid-Term Examination |
| 9 | Mid-Term Examination |
| 10 | Reversible and irreversible processes, Carnot cycle |
| 11 | The Carnot heat engine, the Carnot refrigerator and heat pump. |
| 12 | The Carnot heat engine, the Carnot refrigerator and heat pump |
| 13 | Second-law analysis of engineering systems. |
| 14 | Second-law analysis of engineering systems. |
| 15,16 | Final Exam |
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| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Time (Hour)** | **Total Workload (Hour)** |
| Course Time (number of course hours per week) | 14 | 3 | 42 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 2 | 3 | 6 |
| Homework |  |  |  |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) |  |  |  |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
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| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 50 | 50 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 50 | 50 |
|  | **Total workload** | | **152** |
|  | **Total workload / 30** | | **5.06** |
|  | **Course ECTS Credit** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 60 |
| **Total** | 100 |

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| **RELATIONSHIP BETWEEN THE COURSE LEARNING OUTCOMES AND THE PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low) | | |
| **NO** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | Sufficient knowledge of engineering subjects related with mathematics, science and own branch; an ability to apply theoretical and practical knowledge on solving and modeling of engineering problems. | 3 |
| **2** | Ability to determine, define, formulate and solve complex engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods. | 2 |
| **3** | Ability to design a complex system, a component and/or an engineering process under real life constrains or conditions, defined by environmental, economical and political problems; for that purpose an ability to apply modern design methods. | 1 |
| **4** | Ability to develop, select and use modern methods and tools required for engineering applications; ability to effective use of information technologies. | 1 |
| **5** | In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results. | 2 |
| **6** | Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence. | 2 |
| **7** | Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language. | 2 |
| **8** | Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement. | 3 |
| **9** | Understanding of professional and ethical issues and taking responsibility | 3 |
| **10** | Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development. | 1 |
| **11** | Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions. | 1 |
| **12** |  |  |

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| **LECTUTER(S)** | | | | |
| **Prepared by** |  |  |  |  |
| **Signature(s)** |  |  |  |  |

**Date:**06.06.2024