**ESOGU AERONAUTICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| INTRODUCTION TO JET ENGINES | 152417xxxx |

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| **Semester** | **Number of Course Hours per Week** | **ECTS** |
| **Theory** | **Practice** |
|  | 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 | Elective |

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| **Prerequisite(s) if any** | Mathematic, Physics, Chemistry. Thermodynamics, Fluid Mechanic |
| **Objectives of the Course** | Description of Gas turbine and Jet engines. Calculations of thermodynamic properties and cycle analysis.  Definitions of basic engine components and design parameters, engine characteristics, and efficiencies.  Gas turbine and Jet engine applications in aeronautics. efficiencies.Description of Gas turbine and Jet engines. Calculations of thermodynamic properties and cycle analysis.  Definitions of basic engine components and design parameters, engine characteristics, and efficiencies.  Gas turbine and Jet engine applications in aeronautics. |
| **Short Course Content** | Fundamentals of gas turbine and jet engine technologies.  Working principle of the engines, their thermodynamic cycles, efficiencies, and components.  Gas turbine and jet engine applications in aeronautics..  |

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| **Learning Outcomes of the Course** | **Contributed PO(s)**  | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** |  Learn the types and working principles of gas turbine and jet engines |  |  |  |
| **2** | Understand the thermodynamic parameters and the ideal engine assumptions |  |  |  |
| **3** | Conduct thermodynamic cyclic analyses  |  |  |  |
| **4** | Understand thermodynamic efficiencies |  |  |  |
| **5** | Learn the engine components |  |  |  |
| **6** | Know gas turbine and jet engine applications in aeronautics |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Fundamentals of Gas Turbines, William W. Bathie, John Wiley & Sons Inc., ISBN:0-471-31122--7  |
| **Supporting References** | 1. Thermodynamics An Engineering Approach, Yunus A. Çengel and Michael A. Boles. ISBN: 978-975-6240-26-72. Gaz Türbinleri, Selim Çetinkaya, Nobel yayın dağıtım ltd, ISBN:975-591-102-23. GTMS Gas Türbinli Motor Sistemleri Hikmet Karakoç and Enis T. Turgut, CIP Anadolu Üniversitesi Kütüphane ve Dökümantasyon Merkezi, ISBN: 978-975-06-0534-5 |
| **Necessary Course Material** | Engine models |

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| **Course Schedule** |
| 1 |  Introduction, classification of engines, general notions and descriptions |
| 2 |  Thermodynamic definition of the ideal engine, comparative study of engine cycles, Thermodynamic study of Brayton and Jet propulsion cycles |
| 3 |  Thermodynamic study of Brayton cycles |
| 4 | Thermodynamic study of  Brayton cycle with regeneration  |
| 5 | Thermodynamic study of  Brayton cycle with intercooling and reheating  |
| 6 |  Real cycles  |
| 7 |  Jet propulsion cycles and efficiency |
| 8 | Midterm Exam |
| 9 |  Jet engine compressors  |
| 10 |  Jet engine combustion chambers |
| 11 |  Jet engine Turbines |
| 12 |  Jet engine after burners |
| 13 |  Project presentation on jet engines in aeronautics |
| 14 |  Project presentation on jet engines in aeronautics |
| 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) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| 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 | 30 |
| Quiz |  |
| Homework |  |
| Project Observation | 25 |
| Bir öğe seçin. |  |
| **Final Exam** | 45 |
| **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. | 3 |
| **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. | 3 |
| **7** | Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language. | 3 |
| **8** | Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement. | 2 |
| **9** | Understanding of professional and ethical issues and taking responsibility  | 2 |
| **10** | Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development. | 2 |
| **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. | 2 |
| **12** |  |  |

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

**Date:**06.06.2024