**ESOGU AERONAUTICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Aircraft Performance | 152415006 |

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

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

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

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | Understanding the standard atmosphere model, understanding aerostatic buoyancy and aerodynamic lift forces, deriving equations of motion with point-body approach, cruising, climbing, descending, take-off, landing, return flights in turbojet and piston-propeller aircraft. equations, determination of required performance parameters (L/D, W/S, T/W…) for minimum and maximum flight capabilities (maximum lift, maximum range, minimum turning radius, minimum descent rate,…), flight and performance envelopes understanding, understanding the Vn diagram, understanding the energy model. |
| **Short Course Content** | Understanding aircraft morphology and performance characteristics, deriving necessary equations of motion and performance equations. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understanding the standard atmosphere model, | 1, 2 | 1, 11 | A |
| **2** | Understanding aerostatic buoyancy and aerodynamic lift forces, | 2, 3 | 1, 11 | A |
| **3** | Deriving equations of motion with point-body approach, cruising, climbing, descending, take-off, landing, return flights in turbojet and piston-propeller aircraft. | 2, 3 | 1, 11 | A |
| **4** | Equations, determination of required performance parameters (L/D, W/S, T/W…) for minimum and maximum flight capabilities (maximum lift, maximum range, minimum turning radius, minimum descent rate,…), | 3, 4 | 1, 11 | A |
| **5** | Flight and performance envelopes understanding, understanding the Vn diagram, understanding the energy model. | 5, 6 | 1, 11 | A |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | John D. Anderson, Jr., Uçuşa Başlangıç (Introduction To Flight), Çev: Adil Yükselen, Nobel Akademik Yayıncılık, |
| **Supporting References** | Yechout, T. R., & Morris, S. L. (2003). Introduction to aircraft flight mechanics: Performance, static stability, dynamic stability, and classical feedback control. Reston, VA: American Institute of Aeronautics and Astronautics. |
| **Necessary Course Material** | - |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Basic properties of fluids, and standard atmosphere, |
| **2** | Fundamentals of propulsion |
| **3** | Dynamic similarity, Reynold and Mach numbers |
| **4** | Flow around airfoil @ one AoA, pitot-static tube and airspeed measurement, |
| **5** | Aerostatic and aerodynamic forces, dimensional analysis, aerodynamic coefficients |
| **6** | Introduction to aircraft performance, equations of motion for point-mass model,  Calculation of performance parameters of steady state level flight turbojet aircraft, |
| **7** | Calculation of performance parameters of steady state level flight turbojet aircraft, |
| **8** | Mid-Term Exam |
| **9** | Calculation of performance parameters of steady state level flight propeller aircraft, |
| **10** | Calculation of performance parameters of steady state level flight propeller aircraft, |
| **11** | Climb and descent flight performance equations |
| **12** | Turning flight performance equations |
| **13** | Performance parameters calculation with energy model |
| **14** | Performance parameters calculation with energy model |
| **15** | Performance parameters calculation with energy model |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |  |  |
| Studying for Mid-Term Exam | 1 | 2 | 2 |
| Final Exam | 1 | 10 | 10 |
| Studying for Final Exam | 1 | 2 | 2 |
|  | **Total workload** | | **92** |
|  | **Total workload / 30** | | **3.06** |
|  | **Course ECTS Credit** | | **3** |

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

|  |  |  |
| --- | --- | --- |
| **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. | 5 |
| **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. | 4 |
| **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. | 3 |
| **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. | 4 |
| **6** | Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence. | 4 |
| **7** | Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language. | 1 |
| **8** | Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement. |  |
| **9** | Understanding of professional and ethical issues and taking responsibility |  |
| **10** | Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development. |  |
| **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. |  |
| **12** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Selim Gürgen |  |  |  |
| **Signature(s)** |  |  |  |  |

**Date:**06.06.2024