**ESOGU AERONAUTICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Aerospace Structures |  |

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| **Semester** | **Number of Course Hours per Week** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 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** | No |
| **Objectives of the Course** | The student who takes the course will have the necessary information about the examination of the conditions that determine the design of aircraft structures and the analysis of aerospace structures. |
| **Short Course Content** | Material properties. The main structural elements in the aircraft. Loads on the plane. V-N diagrams. Aircraft loads. Structural analysis of aircraft infrastructures. frames, wing sections. Elastic stability: Column buckling, buckling of flat and curved panels, buckling analysis of stiffened closed section box beams, post-buckling behavior of stiffened straight and curved panels. |

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| **Learning Outcomes of the Course** | **Contributed PO(s)**  | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Introduction of newly developed materials | All | 1,7 | A, D |
| **2** | These materials "Aerospace Industry Practices" | All | 1, 7 | A,D |
| **3** | recognize the technological developments reflected in the civilian sector through these applications | All | 1,7 | A, D |
| **4** | As an engineer, to be able to design new designs in this light of development and to be able to perceive existing developments | All | 1, 7 | A,D |
| **5** | To have knowledge about the industrial facilities in the sector and to have information about their possibilities so that they can establish relations between the topics seen and learned and the topics in the sector | All | 1,7 | A, D |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Lecture Notes, Composite Materials for Aircraft Applications (Deo R.B.), A dan Z ye Dünya Uçakları ve Helikopterleri (Kuşhan M.C.) |
| **Supporting References** |  |
| **Necessary Course Material** |  |

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| **Course Schedule** |
| **1** | Main structural elements in aircraft and spacecraft, their functions. Flexible truss structures used in space applications |
| **2** | Flexural analysis of tapered and non-tapered open-section beams: stiffener loads, web shear flows, shear center. |
| **3** | Flexural and torsional analysis of tapered and non-tapered wing and fuselage and spacecraft structures as closed-section multi cell box beams. Usual assumptions for such structures in the analysis of stiffener loads, shear flow, shear center and angle of twist. |
| **4** | Production Management Functional Structure |
| **5** | Plastics as Defense Technology Materials |
| **6** | Bending of unsymmetrical sections with emphasis on unsymmetrical wing-box cross-sections |
| **7** | The stability (local buckling) of wing and fuselage skin panels as flat and curved plates under compression, bending, shear, and combined loading; local buckling of round tubes |
| **8** | Mid-Term Exam |
| **9** | Post-buckling behavior of stiffened flat and curved plates : effective width concept used in the analysis of wing and fuselage skin panels |
| **10** | Failure criteria for isotropic brittle and ductile materials. |
| **11** | Ultimate strength of round tubes in bending and torsion; combined loading of round tubes. |
| **12** | Assignment Presentation |
| **13** | Assignment Presentation |
| **14** | Assignment Presentation |
| **15** | Assignment Presentation |
| **16,17** | 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) | 3 | 1,75 | 1,5 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | --- | --- | --- |
| Homework | 2 | 140 | 140 |
| Quiz Exam | --- | --- | --- |
| Studying for Quiz Exam | --- | --- | --- |
| Oral exam  | 1 | 0,25 | 0,25 |
| Studying for Oral Exam  | --- | --- | --- |
| Report (Preparation and presentation time included) | 1 | 15 | 15 |
| Project (Preparation and presentation time included) | --- | --- | --- |
| Presentation (Preparation time included) | 1 | 0,25 | 0,25 |
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| Mid-Term Exam | 1 | 0,75 | 0,75 |
| Studying for Mid-Term Exam | --- | --- | --- |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | --- | --- | --- |
|  | **Total workload** | **158,75** |
|  | **Total workload / 30** | **5,29** |
|  | **Course ECTS Credit** | **5** |

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| **Evaluation** |
| **Activity Type** | **%** |
| Mid-term | 10 |
| Homework | 60 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 30 |
| **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 mathematics, science and engineering; Ability to apply theoretical and applied knowledge in these fields to model and solve engineering problems | 5 |
| **2** | Ability to identify, define, formulate and solve complex engineering problems in engineering and related fields by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, device or product in line with a determined goal, under realistic constraints and conditions, by applying modern design methods. | 5 |
| **4** | Ability to develop, select and use modern techniques and tools necessary for engineering applications and to effectively benefit from information technologies. | 5 |
| **5** | Ability to design experiments, conduct experiments, collect data, analyze and interpret results for the study of engineering problems. | 5 |
| **6** | Ability to work individually, within and across disciplines as a team | 5 |
| **7** | Ability to communicate effectively in Turkish verbally and in writing and the ability to use/improve foreign language knowledge. | 5 |
| **8** | Awareness of the necessity of lifelong learning; the ability to access information, follow developments in science and technology and constantly renew oneself | 5 |
| **9** | Awareness of professional and ethical responsibility | 5 |
| **10** | Knowledge of project management and business practices such as risk management and change management; awareness about entrepreneurship, innovation and sustainable development | 5 |
| **11** | Information about the effects of engineering practices on health, environment and safety at universal and social dimensions; Awareness of national and international legal regulations and standards and the legal consequences of engineering solutions | 5 |
| **12** |  |  |

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| **LECTUTER(S)** |
| **Prepared by** | Prof. Melih Cemal Kushan (PhD) |  |  |  |
| **Signature(s)** |  |  |  |  |

**Date:**06.06.2024