**ESOGU AERONAUTICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| **STATICS** | **1524xxx** |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 2 | 3 | 0 | 4 |

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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 provide the basic skills required of engineering students in mechanics of static structures. |
| **Short Course Content** | The course, Statics deals with forces acting on particles or rigid bodies at rest state. Forces are from a wide range covering forces in plane, forces in space, equilibrium, moment of a force, moment of a couple etc. Within the scope of this course, analyses on resultant forces are given. In addition to single bodies, force analyses in many-body systems such as structures and assemblies are taught. The course mainly needs a trigonometry background along with main physics concepts. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Determining force and moment components. | 1, 2 | 1, 11 | A |
| **2** | Understanding vector analysis, computing dot products, moments and resultants related to engineering problems. | 2, 3 | 1, 11 | A |
| **3** | Producing simple Free-Body-Diagrams for static structures. | 2, 3 | 1, 11 | A |
| **4** | Solving equilibrium equations of static structures. | 3, 4 | 1, 11 | A |
| **5** | Finding member forces in many-body systems such as trusses, frames and structures. | 5, 6 | 1, 11 | A |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | R. C. Hibbeler, Engineering mechanics. Statics, Fourteenth edition. Hoboken, N.J: Pearson Prentice Hall, 2016. |
| **Supporting References** | J. L. Meriam and L. G. Kraige, Engineering mechanics. Statics. Hoboken, Wiley, 2010. |
| **Necessary Course Material** | - |

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| **Course Schedule** | |
| **1** | General Principles: Mechanics, Fundamental Concepts, Units of Measurement, The International System of Units, Numerical Calculations, General Procedure for Analysis |
| **2** | Force Vectors: Scalars and Vectors, Vector Operations, Vector Addition of Forces, Addition of a System of Coplanar Forces, Cartesian Vectors, Addition of Cartesian Vectors, Position Vectors |
| **3** | Equilibrium of a Particle: Force Vector, Dot Product, Condition for the Equilibrium of a Particle, The Free-Body Diagram, Coplanar Force Systems, Three-Dimensional Force Systems |
| **4** | Force System Resultants: Moment of a Force-Scalar Formulation, Cross Product, Moment of a Force-Vector Formulation, Principle of Moments, Moment of a Force, Moment of a Couple |
| **5** | Force System Resultants: Simplification of a Force and Couple System, Further Simplification of a Force and Couple System, Reduction of a Simple Distributed Loading |
| **6** | Equilibrium of a Rigid Body: Conditions for Rigid-Body Equilibrium, Free-Body Diagrams, Equations of Equilibrium, Two- and Three-Force Members |
| **7** | Equilibrium of a Rigid Body: Free-Body Diagrams, Equations of Equilibrium, Constraints |
| **8** | Mid-Term Exam |
| **9** | Structural Analysis: Simple Trusses, The Method of Joints, Zero-Force Members, The Method of Sections, Space Trusses, Frames and Machines |
| **10** | Internal Forces: Internal Loadings Developed in Structural Members, Shear and Moment Equations and Diagrams, Relations between Distributed Load, Shear, and Moment, Cables |
| **11** | Internal Forces: Internal Loadings Developed in Structural Members, Shear and Moment Equations and Diagrams, Relations between Distributed Load, Shear, and Moment, Cables |
| **12** | Friction: Dry Friction, Problems Involving Dry Friction, Wedges, Frictional Forces on Screws |
| **13** | Friction: Frictional Forces on Flat Belts, Frictional Forces on Collar Bearings, Pivot Bearings, and Disks, Frictional Forces on Journal Bearings, Rolling Resistance |
| **14** | Center of Gravity and Centroid: Center of Gravity, Center of Mass, and the Centroid of a Body, Composite Bodies, Resultant of a General Distributed Loading |
| **15** | Moments of Inertia: Definition of Moments of Inertia for Areas, Product of Inertia for an Area, Moments of Inertia for an Area about Inclined Axes, Mohr’s Circle for Moments of Inertia |
| **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) | 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 | 30 | 30 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 30 | 30 |
|  | **Total workload** | | **112** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credit** | | **4** |

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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. | 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** |  |  |

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

**Date:**06.06.2024