**ESOGU MECHANICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| MACHINE ELEMENTS I | 151815357 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 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** | None |
| **Objectives of the Course** | Introduction to machine elements; to provide the ability to make calculations related to machine elements using basic engineering sciences, standards and design criteria for strength calculations. |
| **Short Course Content** | The importance of knowledge of machine elements in construction activities; principles of calculation, shaping and use of machine elements; welding connections, shape and force-dependent shaft-hub connections, pins and pins, bolt connections and screw mechanisms, springs. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Be able to define machine elements and their usage principles. | 1, 2, 3 | 1, 5, 8, 10, 11 | A, K |
| **2** | Be able to interpret the strength calculations of machine elements using basic engineering sciences. | 1, 2, 3 | 1, 5, 8, 10, 11 | A, K |
| **3** | Can apply construction knowledge to shape machine elements. | 1, 2, 3 | 1, 5, 8, 10, 11 | A, K |
| **4** | Calculate the permanent strength of machine elements | 1, 2, 3 | 1, 5, 8, 10, 11 | A, K |
| **5** | Design shape and force-dependent shaft-hub connections, connections made with pins and bolts, bolt connections, screw mechanisms and springs. | 1, 2, 3 | 1, 5, 8, 10, 11 | A, K |
| **6** | Can evaluate designed machine elements with the awareness of following developments in production and technology and updating information. | 1, 2, 3 | 1, 5, 8, 10, 11 | A, K |

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| **Main Textbook** | BABALIK, F. C., Makine Elemanları ve Konstrüksiyon Örnekleri, Dora Basım Yayın Dağıtım, Bursa |
| **Supporting References** | SHIGLEY, J.E., Mechanical Engineering Design (Metric Edition), McGraw-Hill Book Company, 1986 |
| **Necessary Course Material** | Projector |

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| **Course Schedule** | |
| **1** | Strength Calculation in Machine Elements (General Calculation Methods, Common Strain States and Comparative Stresses, Application of Fracture Hypotheses to Machine Elements, Change of Force with Time, Static Load, Dynamic Load, Strength Values ​​of Materials in Static and Dynamic Load). |
| **2** | Calculation of Machine Elements Working Under Constant Strength, Dynamic and Static Loads, Applications |
| **3** | Calculation of Machine Elements Working Under Constant Strength, Dynamic and Static Loads, Applications |
| **4** | Welding Joints, Welding Joint Forms, Welding Construction Rules |
| **5** | Strength Calculation of Weld Seams, Applications |
| **6** | Shaped Shaft-Hub Connections, Profiled Shafts and Hubs, Pins, Pins, Applications |
| **7** | Shaped Shaft-Hub Connections (Curved Key Connections, Hollow Key Connections), Applications |
| **8** | Mid-Term Exam |
| **9** | Force-Dependent Shaft-Hub Connections (Tightening Connections, Conical Fitting Connections Example Applications) |
| **10** | Force-Connected Shaft-Hub Connections (Press Fit Connections), Sample Applications |
| **11** | Bolted Connections (Construction Principles, Bolt Materials and Production Methods, Bolt Connection Types); Bolt Strength Calculations. |
| **12** | Prestressed Bolted Connections; Movement Bolts; Sample Applications |
| **13** | Prestressed Bolted Connections; Sample Applications |
| **14** | Springs (Spring Characteristics, Spring Coefficient, Spring Materials, Spring Combinations); Springs Forced in Tension and Compression; Springs Forced in Bending; Sample Applications |
| **15** | Springs (Torsionally Forced Springs); Sample Applications |
| **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,….) | 14 | 2 | 28 |
| 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 | 1.5 | 1.5 |
| Studying for Mid-Term Exam | 1 | 30 | 30 |
| Final Exam | 1 | 1.5 | 1.5 |
| Studying for Final Exam | 1 | 32 | 32 |
|  | **Total workload** | | **135** |
|  | **Total workload / 30** | | **4.5** |
|  | **Course ECTS Credit** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 50 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 50 |
| **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** | Adequate knowledge of mathematics, science and Mechanical Engineering; ability to apply theoretical and practical knowledge in these fields to model and solve Mechanical Engineering problems. | 4 |
| **2** | Ability to identify, define, formulate and solve complex engineering problems in Mechanical Engineering and related fields by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | Ability to design a complex system, device or product for a specified purpose under realistic constraints and conditions by applying modern design methods. | 4 |
| **4** | Ability to develop, select, use modern techniques and tools required for Mechanical Engineering applications and to effectively utilize information technologies. | 3 |
| **5** | Ability to design and conduct experiments, collect data, analyze and interpret results to investigate Mechanical Engineering problems. | 3 |
| **6** | Ability to work individually, within disciplines and in interdisciplinary teams | 4 |
| **7** | Ability to communicate effectively in Turkish, both verbally and in writing, and to use/improve foreign language knowledge | 2 |
| **8** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility | 2 |
| **10** | Knowledge of business practices such as project management, risk management and change management; awareness of entrepreneurship, innovation and sustainable development | 1 |
| **11** | Knowledge of the global and societal impacts of engineering practices on health, the environment and safety; awareness of national and international legal regulations and standards and the legal implications of engineering solutions. | 3 |

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| **LECTUTER(S)** | | |
| **Prepared by** | Assoc.Prof. Dr. Ümit ER | Assistant Professor Dr. ABDULLAH SERT |
| **Signature(s)** |  |  |

**Date:**06.06.2024