**ESOGU MECHANICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| MACHINE ELEMENTS II | 151816369 |

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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** | None |
| **Objectives of the Course** | To provide the ability to shape axles and shafts, make deformation and vibration calculations; define rolling bearings, determine bearing size and bearing life under static and dynamic loads; define sliding bearings, determine load carrying capacity and calculate bearing temperature; define gear wheels and gear wheel mechanisms, make strength calculations and size; define belt-pulley mechanisms, select them and give calculation styles and standards. |
| **Short Course Content** | Shafts and axles, rolling bearings, sliding bearings, gear wheels, belt-pulley mechanisms |

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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** | Able to design axles and shafts, rolling and sliding bearings, gear wheels and belt-pulley mechanisms. | 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** | Definition and Classification of Shaft and Axle; Construction principles of Shaft and Axle; Dynamic Behavior of Shafts |
| **2** | Strength Calculations of Shafts and Axles; Deformations; Sample Applications |
| **3** | Strength Calculations of Shafts and Axles; Sample Applications |
| **4** | Structure of Bearings; Standard Bearings; Bearing Symbols; Mounting of Bearings; Arrangements of Bearings; Tolerances and Fits in Bearings; Sealing Arrangements of Bearings; |
| **5** | Lubrication of Rolling Bearings; Load Carrying Ability and Bearing Life of Rolling Bearings; Sample Applications |
| **6** | Lubricants in sliding bearings, Viscosity; Formation of oil pressure in hydrodynamic and hydrostatic sliding bearings; Construction features of hydrodynamic radial and axial sliding bearings; Lubrication systems and arrangements of hydrodynamic bearings; |
| **7** | Hydrodynamic Bearing Calculations in Radial and Axial Bearings; Sample Applications. |
| **8** | Mid-Term Exam |
| **9** | Gear Main Law; Gear Wheel Main Dimensions; Main Concepts in Gear Wheel Mechanisms; Tooth Root Cutting, Corrected gears; |
| **10** | Gear Main Law; Gear Main Dimensions; Main Concepts in Gear Mechanisms; Tooth Root Cutting, Reconstructed Gears; Sample Applications. |
| **11** | Strength Calculations and Dimensioning of Cylindrical Gears (External and Internal Contact Spur Gears, Helical Gears); |
| **12** | Strength Calculations and Dimensioning of Bevel Gears; |
| **13** | Strength Calculations and Dimensioning in Worm Gear Mechanisms; |
| **14** | General Calculation Method in Belt Pulley Mechanisms; Dimensioning of Flat Belts |
| **15** | Sizing of V-Belts; 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) |  |  |  |
| 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