**ESOGU MECHANICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| PNEUMATIC CIRCUITS | 151818461 |

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| **Semester** | **Number of Course Hours per Week** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 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** |
| Turkish | Undergraduate | Elective |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Introducing the drive systems and equipment used in mechanical engineering, to create pneumatic circuit systems according to the requirements using hydraulic circuit elements, to design pneumatic systems and to provide qualifications regarding the maintenance and repair of machines. Establish a working/functional pneumatic circuit by selecting the elements to create a new pneumatic system. |
| **Short Course Content** | General information about the examination of pneumatic system elements; pneumatic pumps; pneumatic motors; pneumatic valves; accumulators; pneumatic cylinders. General information about the establishment of pneumatic circuits, automation, comparison of hydraulic and pneumatic systems, fault analysis in pneumatic systems and periodic maintenance. |

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| **Learning Outcomes of the Course** | **Contributed PO(s)**  | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Introducing pneumatic circuit elements and designing pneumatic systems | 1, 3, 6 | 1, 5, 6, 7, 11 | A, B, K |
| **2** | Understanding the working characteristics of pneumatic elements and circuits and analyzing pneumatic systems. | 1, 2, 5, 6 | 1, 2, 4, 5, 11 | A, B, I, K |
| **3** | Making calculations related to pneumatic systems. | 1, 3, 6, 7 | 1, 2, 6, 10, 11 | A, B, I, K |
| **4** | Making basic maintenance and repairs of pneumatic units | 1, 2, 5 | 1, 2, 5, 11, 12 | A, B, K |
| **5** | Introducing pneumatic elements and understanding and interpreting how the circuit will work in a circuit diagram | 1, 2, 5, 6 | 5, 7, 10, 11, 12 | A, B, K |
| **6** | Establishing a working/functional pneumatic circuit by selecting elements to create a new pneumatic system. | 1, 6, 7, 10 | 7, 10, 11, 12, 13 | A, B, I, K |

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| **Main Textbook** | Hydraulic Systems, Ravi D., Andries B. Elsevier, March, 2005.Hydraulic and Pneumatic Theory and Applications, Prof. Dr. Yaşar Pancar, 1998.Hydraulic - Pneumatic FESTO –Publ., 2010. |
| **Supporting References** | Handbook of Hydraulic Fluid Technology, George Toten, Newyork, 1998.Hydraulic Fluid Power, Fatih Özcan-Mert Educational Publ.,2016.Hydraulic handbook, 8th Ed., R.H.Warring, Trade and Techn. Press, England, 1983. |
| **Necessary Course Material** | Computer, lecture notes, books, projector and machine equipment in pneumatic laboratory. |

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| **Course Schedule** |
| **1** | Application of pressure units, Pascal's law, continuity in flow and Bernoulli's equation |
| **2** | Understanding the properties of pneumatic fluid, advantages and disadvantages of hydraulic systems |
| **3** | Introducing pneumatic circuit elements |
| **4** | Introducing standard symbols used in pneumatics |
| **5** | Introducing and understanding pneumatic pumps and hydraulic cylinders |
| **6** | Introducing and understanding pneumatic valves, accumulators and other circuit elements |
| **7** | Creating a pneumatic circuit diagram |
| **8** | Mid-Term Exam |
| **9** | To ensure that the isothermal process at constant temperature, the working principles of pneumatic cylinders, and the functions of the elements used in pneumatic circuits are understood. |
| **10** | To understand the working principles of pneumatic circuits and to select the elements used |
| **11** | To design working sample pneumatic circuits |
| **12** | To control the layout and movement of the elements used in pneumatic circuit design |
| **13** | To detect and analyze the faults of pneumatic systems |
| **14** | To solve pneumatic faults |
| **15** | To perform periodic checks and maintenance of the systems |
| **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 | 3 | 42 |
| Homework |  |  |  |
| Quiz Exam | 2 | 2 | 4 |
| Studying for Quiz Exam | 2 | 4 | 8 |
| 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 | 15 | 15 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | **135** |
|  | **Total workload / 30** | **4,5** |
|  | **Course ECTS Credit** | **5** |

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| **Evaluation** |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 10 |
| Quiz | 10 |
| 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 in mathematics, science and mechanical engineering; developing the ability to apply theoretical and applied knowledge in these fields to model and solve mechanical engineering problems. | 5 |
| **2** | The skills to detect, define, formulate and solve complex engineering problems in Mechanical Engineering and related fields by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | Ability to design a complex system, device or product under realistic constraints and conditions, in line with a specified goal, 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. | 2 |
| **5** | The skills to design and conduct experiments, collect data, analyze and interpret results to investigate Mechanical Engineering problems. | 5 |
| **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 | 1 |
| **8** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology, and constantly renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility | 5 |
| **10** | Knowledge of business practices such as project management, risk management and change management; awareness of entrepreneurship, innovation and sustainable development | 3 |
| **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. | 2 |

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| **LECTUTER(S)** |
| **Prepared by** | Assoc. Prof. Dr. H. Sevil ERGÜR |  |  |  |
| **Signature(s)** |  |  |  |  |

**Date:**11.07.2024