**ESOGU MECHANICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| VENTILATOR DESIGN | 151818422 |

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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** | To make knowledge and competence about the importance and classification of fans in ventilation systems and heating and cooling processes, and the fans preferred in industrial and commercial applications and their operating laws. |
| **Short Course Content** | To provide knowledge and skills about general definitions of fans, classification according to purpose of use, location, drive type and application area, fan selection, fan theory and determination of fan design conditions. |

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| **Learning Outcomes of the Course** | **Contributed PO(s)**  | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | To ensure that the basic equations and working principles used in fluid mechanics, heating and cooling processes are applied to fans. | 1, 4, 5, 6 | 1, 5, 6, 11, 12 | A, B, K |
| **2** | To get that energy transfer and energy efficiency analyses are performed for the installation where fans will be used. | 1, 2, 5, 6 | 1, 2, 4, 5, 11 | A, B, K |
| **3** | To obtain knowledge and skills about fan laws, working principles, designs and operating characteristics. | 1, 2, 4 | 1, 2, 5, 6, 11 | A, B, I, K |
| **4** | To achieve competence in design and fan selection methods suitable for fan characteristics. | 1, 2, 5 | 1, 2, 5, 11, 12 | A, B, I, K |
| **5** | To attain the knowledge and skills regarding cavitation control, efficiency and power analysis and design in fans. | 1, 2, 5, 6 | 1, 2, 5, 6, 11 | A, B, I, K |
| **6** | Gathering the knowledge and skills regarding drawing methods of speed triangles for fan design and fan selection. | 1, 2, 5, 6 | 1, 2, 4, 5, 6,10 | A, B, I, K |

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| **Main Textbook** | 1) Çengel, Y. A., Cimbala, J. M. (2015). Fluid Mechanics-Fundamentals and ApplicationsPalme Publishing, Ankara.2) Hydraulic Machines, İ. Karagöz, Bursa, 20093) Hydraulic Machines and Applications, Y. Pancar and S. Ergür, Eskişehir, 2007 |
| **Supporting References** | 1) Dixon, S. L. (1998). Fluid Mechanics and Turbomachinery, 4th ed., Oxford: New Delhi.2) Eck, B. (1973). Fans, Design and Operation of Centrifugal, Axial Flow And Cross Flow Fans. Biddles Ltd. Great Britain. |
| **Necessary Course Material** | Computer, lecture notes, books, projector and machine equipment in pneumatic laboratory. |

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| **Course Schedule** |
| **1** | General information about fluid mechanics, ventilation, heating and cooling basic energy equations and machines used in energy conversion in application areas. |
| **2** | General information about the importance and classification of fans |
| **3** | General information about the preferred fans in industrial and commercial areas and their operating laws |
| **4** | Pressure and load definitions in fans |
| **5** | Dimensionless characteristics in fans |
| **6** | Similarity theory in fans, definitions of power and efficiency |
| **7** | Factors affecting fan performance |
| **8** | Mid-Term Exam |
| **9** | General information and calculation methods on fan characteristics |
| **10** | Fan theory and fan laws |
| **11** | Definition and drawing methods of speed triangles used in fan design, selection and control |
| **12** | Parallel and series connection of fans |
| **13** | Definition and analysis of cavitation in fans |
| **14** | Application of Euler equations in fans. |
| **15** | Determination of the best operating point in fans according to operating characteristics |
| **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. | 3 |
| **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. | 3 |
| **6** | Ability to work individually, within disciplines and in interdisciplinary teams. | 1 |
| **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. | 3 |
| **9** | Awareness of professional and ethical responsibility | 1 |
| **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. | 1 |

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

**Date:**11.07.2024