**ESOGU MECHANICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| STEAM BOILERS | 151817479 |

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| **Semester** | **Number of Course Hours per Week** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 |  | 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** | The aim of the course is for the student taking the course to gain the ability to recognize, interpret and design various steam boiler systems. |
| **Short Course Content** | Classification of steam boilers, recognition of steam boiler elements, steam traps, heat recovery systems, steam distribution line, blowdown systems, flash steam, feed water preparation, economizer, feed water quality. |

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| **Learning Outcomes of the Course** | **Contributed PO(s)**  | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Becoming aware of the types of steam boilers | 3, 6, 11 | 1, 10 | 1 |
| **2** | Having knowledge about steam boiler elements | 3, 6, 11 | 1, 10 | 1 |
| **3** | Gaining information about boiler feed water preparation and water softening | 3, 6, 11 | 1, 10 | 1 |
| **4** | Having knowledge about steam distribution, water hammer, condensate discharge, steam leakage control | 3, 6, 11 | 1, 10 | 1 |
| **5** | Having information about condensate recovery systems, flash steam, steam traps | 3, 6, 11 | 1, 10 | 1 |
| **6** | Heating load and condensate load calculation in main steam lines, steam leaks and energy losses calculation | 3, 6, 11 | 1, 10 | 1 |
| **7** | Blowdown systems | 3, 6, 11 | 1, 10 | 1 |
| **8** | Boiler water level control and its importance | 3, 6, 11 | 1, 10 | 1 |
| **9** | Boiler efficiency calculation, steam applications | 3, 6, 11 | 1, 10 | 1 |
| **10** | Use of steam in power plants | 3, 6, 11 | 1, 10 | 1 |

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| **Main Textbook** | Buhar Tesisatı Isısan çalışmaları No 252  |
| **Supporting References** |  Buhar Sistemleri MaxVal, Buhar Tesisatları ve Buhar Cihazları El kitabı InterValf |
| **Necessary Course Material** |  |

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| **Course Schedule** |
| **1** | Boiler definition, boiler types |
| **2** | Boiler feed water preparation, water softening techniques |
| **3** | Boiler limestones, boiler blowdown systems, boiler water level control |
| **4** | Steam traps, condensate load in steam lines, heating load, steam trap steam leakage control |
| **5** | Steam leaks-fuel consumption, steam trap selection, condensate discharge, condensate tank |
| **6** | Condensate recovery, condensate return line |
| **7** | Causes of condensate pollution, flash steam |
| **8** | Mid-Term Exam |
| **9** | Process heating, industrial facilities |
| **10** | Steam leaks, energy losses |
| **11** | Steam line diameter determination |
| **12** | Process control devices |
| **13** | Ram stroke, causes, effects |
| **14** | Reasons that reduce heat transfer efficiency, Boiler efficiency |
| **15** | Use of steam in power plants |
| **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 | 0 | 0 | 0 |
| Quiz Exam | 0 | 0 | 0 |
| Studying for Quiz Exam | 0 | 0 | 0 |
| Oral exam  | 0 | 0 | 0 |
| Studying for Oral Exam  | 0 | 0 | 0 |
| Report (Preparation and presentation time included) | 1 | 10 | 10 |
| Project (Preparation and presentation time included) | 1 | 15 | 15 |
| Presentation (Preparation time included) | 1 | 10 | 10 |
| Mid-Term Exam | 0 | 0 | 0 |
| Studying for Mid-Term Exam | 0 | 0 | 0 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 15 | 15 |
|  | **Total workload** | **135** |
|  | **Total workload / 30** | **4,5** |
|  | **Course ECTS Credit** | **5** |

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| **Evaluation** |
| **Activity Type** | **%** |
| Mid-term |  |
| Quiz |  |
| Homework |  |
| Presentation | 40 |
| 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 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 method 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 method 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 method  | 3 |
| **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  | 5 |
| **4** | Ability to develop, select and use modern methods and tools required for engineering applications; ability to effective use of information technologies In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results.  | 3 |
| **5** | In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results. Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence  | 1 |
| **6** | Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence  | 5 |
| **7** | Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement Awareness of life-long learning; ability to reach information; follow developments in sc | 1 |
| **8** | Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement  | 5 |
| **9** | Understanding of professional and ethical issues and taking responsibility  | 3 |
| **10** | Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development  | 5 |
| **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  | 5 |

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| **LECTUTER(S)** |
| **Prepared by** | Assoc. Prof. Nihal Uğurlubilek |  |  |  |
| **Signature(s)** |  |  |  |  |

**Date:**06.06.2024