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**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Calculus I | 151911200 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 4 | 0 | 4 | 5 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequieite(s)** |  |
| **Course Objectives** | To introduce the concepts of function, limit, continuity, derivative and integral, which are the basic knowledge of mathematics, and to develop their skills in using them when necessary. |
| **Course Description** | Functions, Limits and Continuity, Derivation and Applications of differentiation, Definite and indefinite integrals, Applications of integration, improper integrals, polar coordinates |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Define the function and reverse function | 1a | 1, 6 | A |
| **2** | Explains limit and continuity. | 1a | 1, 6 | A |
| **3** | Explain coordinate systems. | 1a | 1, 6 | A |
| **4** | Grasp the meaning of derivatives and take derivative | 1a | 1, 6 | A |
| **5** | Grasp the meaning of integral and take integral | 1a | 1, 6 | A |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Balcı, M.,2008, Genel Matematik 1, Balcı Yayınları, Ankara |
| **Supporting Resources** | Koçak, M, Genel Matematik, “Diferansiyel ve İntegral Hesap”.  Balcı, M.,2007, Genel Matematik Problemleri 1, Balcı Yayınları, Ankara |
| **Tools and Equipment Required for the Course** | Lectures and applications |

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| **COURSE SYLLABUS** | |
| **1** | Function concept and properties |
| **2** | Essential functions and their graphs |
| **3** | Trigonometric, exponential, logarithmic and hyperbolic functions |
| **4** | Limit |
| **5** | Continuity |
| **6** | Derivatives and derivation rules |
| **7** | Derivatives of Trigonometric, Exponential, Logarithmic and Hyperbolic functions |
| **8** | **MIDTERM** |
| **9** | L'Hospital's rule, geometric meaning of derivative |
| **10** | Maximum-minimum problems |
| **11** | Drawing curve, indefinite integrals |
| **12** | Integration formulas, definite integrals |
| **13** | Applications of integration |
| **14** | Improper integrals, polar coordinates |
| **15** | Practice |
| **16,17** | **FINAL EXAM** |

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| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 4 | 56 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 4 | 40 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 7 | 2 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 10 | 2 | 20 |
|  | **Total workload** | | **134** |
|  | **Total workload / 30** | | **4.5** |
|  | **Course ECTS Credits** | | **5** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
| **Semester 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Eliz SOYLU YILMAZ |  |  |  |
| **Signature** |  |  |  |  |

** ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| CHEMISTRY | 151911188 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 1 | 3 | 0 | 3 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | To introduce the main subjects of chemistry, to give the fundamentals of chemistry to the engineering students. |
| **Short Course Content** | The properties of material and measurements, atoms and atomic theory, periodic table chemical compounds, chemical reactions stoichiometry, gases and gas mixtures, chemical thermodynamics. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Define, classify and explain the properties of materials, | 1 | 1, 5, 10 | A |
| **2** | Explain the concepts of atoms and atomic theory, | 1 | 1, 5, 10 | A |
| **3** | Explain and use the mole concepts and the Avogadro’s law, | 2 | 1, 5, 10 | A |
| **4** | Explain and classify the chemical compounds, | 1, 2 | 1, 5, 10 | A |
| **5** | Define, explain and use the relationship of the gaseous state, the properties of gases and gas laws, | 5 | 1, 5, 10 | A |
| **6** | Define the basic concepts of thermodynamics, explain the law of thermodynamics and use them in solving the thermochemistry problems. | 4 | 1, 5, 10 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Petrucci, H., Harwood, W. S., Herring, F. G., 2002 “Genel Kimya: İlkeler ve Modern Uygulamalar” (I. Cilt), Çeviri Editörleri: Uyar. T., Aksoy, S., Palme Yayıncılık, Ankara. |
| **Supporting References** | 1. Mortimer**,** C. E. , 1988, **Modern Üniversite Kimyası,** I. ve II. Cilt, Çağlayan Kitabevi, İstanbul  2. Sienko, M. J., Plane, R. A., 1983, **Temel Kimya**, Savaş Yayınları, Ankara.  3. Erdik, E., Sarıkaya, Y., 1987, **Temel Üniversite Kimyası**, Hacettepe Taş Kitapçılık, Ankara. |
| **Necessary Course Material** | Board, projector |

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| **Course Schedule** | |
| **1** | Matter-Its properties and measurement. The scope of chemistry, the scientific method, properties and classification of matter, measurements of matter, uncertainties in scientific measurements. |
| **2** | Atoms and the atomic theory, early chemical discoveries and the atomic theory, electrons and other discoveries in atomic physics, atomic masses, chemical elements. |
| **3** | Introduction to the periodic table, the concept of the mole, the Avogadro constant, using the mole concept in calculation. |
| **4** | Chemical compounds, types of chemical compounds and their formulas, the mole concept and chemical compounds, composition of chemical compounds. |
| **5** | Chemical compounds; oxidation states; A useful toll in describing chemical compounds, naming organic and inorganic compounds. |
| **6** | Chemical reactions and chemical equation, the chemical equation and stoichiometry, chemical reaction in solution. |
| **7** | Chemical reactions and chemical equation, Determining the limiting reactant, other practical matters. |
| **8** | Mid-Term Exam |
| **9** | Gases and Gases Mixers |
| **10** | Gases: Properties of gases; gas pressure, the simple gas laws |
| **11** | Gases: Aplication of the ideal gas equation. |
| **12** | Gases in chemical reaction, mixtures of gases, kinetic-molecular theory of gases, non-ideal gases. |
| **13** | Thermochemistry, getting started; some terminology, work, heat, and calorimetry. |
| **14** | Thermochemistry: The first law of thermodynamics, heats of rection. |
| **15** | Thermochemistry: Hess’s law, standard enthalpies of formation, |
| **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,….) |  |  |  |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **81** |
|  | **Total workload / 30** | | **2.7** |
|  | **Course ECTS Credit** | | **3** |
| **Evaluation** | | | |
| **Activity Type** | **%** | | |
| Mid-term | 40 | | |
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| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Dr. M. ARICI | Assoc. Dr. S. ÇELİK |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| CHEMISTRY LABORATORY | 151911189 |

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| **Semester** | **Number of Course Hours per Week** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 0 | 2 | 1 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | To give the abilities to obtain, evaluate, discuss, report and submit the experimental data by performing the experiments which are the applications of the knowledge of chemistry gained in the chemistry course and to achieve this in accordance with laboratory safety rules. |
| **Short Course Content** | Verification of the Law of Definite Proportions, calculation of the ideal gas constant and the molar volume of a gas, calculation of the equivalent weight and atomic mass of a metal, qualitative analysis, titrimetric analysis, Charles’ Law |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learns to determine the density of solids and liquids. | 1, 5, 6, 9 | 3, 5, 12, 15 | A, E |
| **2** | Analyzes, discusses, interprets and presents the Verification of the Law of Fixed Proportions. | 1, 5, 6, 9 | 3, 5, 12, 15 | A, E |
| **3** | Analyzes, observes and interprets precipitate formation. | 1, 5, 6, 9 | 3, 5, 12, 15 | A, E |
| **4** | Analyzes, discusses, interprets and presents Qualitative Analysis. | 1, 5, 6, 9 | 3, 5, 12, 15 | A, E |
| **5** | Analyzes, discusses, interprets and presents Titrimetric Analysis. | 1, 5, 6, 9 | 3, 5, 12, 15 | A, E |
| **6** | Learns to prepare solutions. | 1, 5, 6, 9 | 3, 5, 12, 15 | A, E |
| **7** | Observes Graham's law of diffusion on the relative diffusion of gases. | 1, 5, 6, 9 | 3, 5, 12, 15 | A, E |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Main Textbook** | Genel Kimya Laboratuvarı |
| **Supporting References** | 1. Petrucci, R. H., Harwood, W. S., Herring, F.G., “Genel Kimya (I. ve II. Cilt)”, (Çeviri), Palme Yayıncılık, Ankara, 2002.  2. Mortimer, C.E., “Modern Üniversite Kimyası (I. ve II. Cilt)” , (Çeviri), Çağlayan Kitabevi, İstanbul, 1988.  All chemistry and general chemistry lab. Textbooks |
| **Necessary Course Material** | Laboratory equipments and experimental setups |

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| **Course Schedule** | |
| **1** | Introduction of the course and giving exam percentages |
| **2** | Occupational Health and Safety Information and Laboratory Material Promotion |
| **3** | Laboratory Substance-Material Introduction |
| **4** | Explaining the safety and laboratory rules, practices and report writing rules that must be followed and determining the experimental groups |
| **5** | Determining the Density of Solids |
| **6** | Determining the Density of Liquids |
| **7** | Verification of the Law of Constant Proportions |
| **8** | Midterm Exams |
| **9** | Precipitate Formation |
| **10** | Qualitative Analysis |
| **11** | Titrimetric Analysis |
| **12** | Solution Preparation |
| **13** | Relative Diffusion Rates of Gases |
| **14** | Make-up Week |
| **15** | Make-up Week |
| **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 | 2 | 28 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 4 | 1 | 4 |
| Homework | 0 | 0 | 0 |
| Quiz Exam | 0 | 1 | 0 |
| Studying for Quiz Exam | 0 | 0 | 0 |
| Oral exam | 5 | 1 | 5 |
| Studying for Oral Exam | 5 | 1 | 5 |
| Report (Preparation and presentation time included) | 5 | 1 | 5 |
| Project (Preparation and presentation time included) | 0 | 0 | 0 |
| Presentation (Preparation time included) | 0 | 0 | 0 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 4 | 4 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 5 | 5 |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credit** | | **2** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Quiz | 60 |
| Report | 40 |
| **Final Exam** |  |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Dr. M. ARICI | Assoc.. Dr. S. ÇELİK |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| PHYSICS I | 151911186 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 3 | 0 | 3 | 3 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | none |
| **Objectives of the Course** | To provide students with basic information about Newtonian mechanics and conservation laws. Ability to define, formulate and analytically solve problems in physical systems; To improve general problem solving ability. |
| **Short Course Content** | Measurement; vectors; movement in one dimension; movement in two and three dimensions; particle dynamics I; particle dynamics II; work and energy; conservation of energy; dynamics of particle systems; collision; rotational kinematics and dynamics; balance of solid bodies; gravity; oscillations. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The student recognizes and solves various problems of physical systems in practice. | PO2, PO3 | 1 | A |
| **2** | Recognizes the importance of measurement and units. | PO1, PO6 | 1 | A |
| **3** | Applies physical systems in daily life. | PO7, PO9, PO10 | 1 | A |
| **4** | Recognizes the role of physics in engineering and health sciences. | PO9 | 1 | A |
| **5** | Explains the basic laws and concepts of physics. | PO6 | 1 | A |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | "1. Halliday, D., Resnick, R., and Walker, J. (2008). Fundamentals of Physics (8th Edition).  John Wiley & Sons, Inc.2. Serway, R.A., Beichner, R.J., Physics For Scientists and Engineers with Modern Physics (2007), Harcourt College Publishers." |
| **Supporting References** | "1. Young, H.D, Freedman, R.A. (2006). University Physics Volume1 (12th Edition). Pearson/Addison Wesley 2.Ohanian, H.C. (1989). Physics (2nd Edition) New York: W.W. Norton & Company, Inc.3.  Giancoli, D.C. (2004). Physics: Principles with Applications (6th Edition). Pearson Education Inc." |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Measurement and Units |
| **2** | Vectors |
| **3** | One-Dimensional Motion |
| **4** | Two-Dimensional Motion |
| **5** | Newton's Laws of Motion and Applications |
| **6** | Work and Power |
| **7** | Energy |
| **8** | Mid-Term Exam |
| **9** | Energy |
| **10** | Momentum and Collision |
| **11** | Momentum and Collision |
| **12** | Rotational Movement |
| **13** | Rotational Motion Applications |
| **14** | Balance |
| **15** | Harmonic Motion |
| **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 | 1 | 14 |
| Homework | 5 | 1 | 5 |
| 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 | 1 |
| Studying for Mid-Term Exam | 7 | 3 | 21 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 14 | 1 | 14 |
|  | **Total workload** | | **99** |
|  | **Total workload / 30** | | **99/30** |
|  | **Course ECTS Credit** | | **3** |

|  |  |
| --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Asst. Prof. Dr. Şadiye Meral ÇAKMAK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| PHYSICS I LAB | 151911187 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 0 | 2 | 1 | 2 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Teaching through conducting experiments on the topics related to the content of Physics I; hence, enhancing the students’ perception and understanding on the important concepts and fundamental laws of the Newtonian Mechanics. |
| **Short Course Content** | Numerical analysis and error calculation, measurement, specification of the components of forces, Newton’s laws of motion, projectile motion, conservation of energy, conservation of momentum, moment of inertia, springs, and viscosity experiments. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | To enhance observational and analytical skills. | 1, 2, 11 | 13 | C |
| **2** | Make measurements with common instruments. | 4, 5 | 3 | I |
| **3** | To be able to analyze quantitative information and errors. | 5, 6 | 15 | E |
| **4** | To be able to represent experimental data by using graphics. | 2, 5 | 15 | E |
| **5** | To be able to compare experimental results with mathematical and physical models, hence make an interpretation. | 5 | 8 | E |
| **6** | Prepare a lab report. | 1, 2, 4, 5, 6 | 15 | E |
| **7** | Develop teamwork skills. | 6 | 12 | C, E, I, K |
| **8** | To get hands on experience about the topics of basic measurements, statics, kinematics, Newton’s Laws, spring constants, viscosity. | 1, 2, 4, 5 | 3 | A, I |
| **9** | Encourage the curiosity for physics and improve the ability to apprehend the solid correlations between physics and engineering applications. | 1 | 11 | I |
| **10** | To obtain knowledge and experience on building basic experimental set ups upon need. | 2, 3, 4 | 3, 6, 10 | I |

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| **Main Textbook** | Physics I Experiments. Eskişehir: Eskişehir Osmangazi Üniversitesi Yayınları Sertaç Eroğlu, Murat Kellegöz, Gökhan Kılıç, Halil Yasin Adıyaman. |
| **Supporting References** | Fundamentals of Physics, Halliday Resnick, John Wiley and Sons Inc. 1988.  Giancoli, D.C. (2004). Physics: Principles with Applications (6th Edition). Pearson Education Inc. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to laboratory, and formation of lab groups. |
| **2** | Numerical analysis and error calculation. |
| **3** | Measurement experiment . |
| **4** | Motion with constant acceleration experiment. |
| **5** | Conservation of linear momentum experiment. |
| **6** | Projectile motion experiment. |
| **7** | Projectile motion experiment. |
| **8** | Mid-Term Exam |
| **9** | Free fall experiment. |
| **10** | Simple pendulum and conservation of energy experiment. |
| **11** | Motion on a frictional inclined plane experiment. |
| **12** | Springs experiment. |
| **13** | Moment of inertia experiment. |
| **14** | Viscosity experiment. |
| **15** | Make up experiment, general review and preparation for final exam. |
| **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) | 2 | 1 | 2 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 2 | 1 | 2 |
| Homework |  |  |  |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 10 | 4 | 40 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 14 | 14 |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credit** | | **2** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term |  |
| Quiz |  |
| Homework |  |
| Report | 50 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. T. AKAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Technical Drawing | 151911205 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 1 | 2 | 2 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The aim is to impart the knowledge and skills necessary to create technical drawings of machine parts, accurately interpret drawn views, and perform dimensioning on technical drawings. |
| **Short Course Content** | Technical drawing terminology, drawing tools, freehand drawing, perspective views, basic and auxiliary views, dimensioning, sectioning, drawing reading |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Draws the basic views of a machine part given a perspective picture. | 3, 8 | 1, 6, 11 | A, D, K |
| **2** | Draws the third view of a machine part given two views. | 3, 8 | 1, 6, 11 | A, D, K |
| **3** | Carries out the dimensioning of perspective drawings and views | 3, 8 | 1, 6, 11 | A, D, K |
| **4** | Reads a drawn technical drawing correctly. | 3, 8 | 1, 6, 11 | A, D, K |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Kıraç, Nejat, (2022), Teknik Resim, Dora Yayınları |
| **Supporting References** | 1. Kıraç, Nejat, (1997), Çözümlü Teknik Resim Problemleri, ESOGÜ TEKAM 2. Şen, İbrahim Zeki, (2019), Teknik Resim –I, De-Ha Yayımcılık 3. Other Technical Drawing Books |
| **Necessary Course Material** | Drawing Tools  Computer and Projector |

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| **Course Schedule** | |
| **1** | Introduction to Technical Drawing |
| **2** | Geometric Drawings |
| **3** | Geometric Drawings |
| **4** | Projections |
| **5** | Placement of Views |
| **6** | Selection and Extraction of Views |
| **7** | Completing Incomplete View |
| **8** | Mid-Term Exam |
| **9** | Dimensioning, Scales |
| **10** | Sectioning |
| **11** | Full Section, Half Section |
| **12** | Partial Section, Rotated Section, Section Moved Out of View |
| **13** | Perspective Painting Types |
| **14** | Cavaliers and Cabinets Perspective |
| **15** | Isometric Perspective |
| **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 | 4 | 56 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 14 | 2,5 | 35 |
| Homework | 4 | 2 | 8 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 3 | 3 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 4 | 4 |
|  | **Total workload** | | **110** |
|  | **Total workload / 30** | | **3,66** |
|  | **Course ECTS Credit** | | **4** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Homework | 30 |
|  |  |
|  |  |
|  |  |
| **Final Exam** | 40 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Ph.D. Kerem AYBAR |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| English I | 151011212 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 1 | 3 | 0 | 2 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Associate degree / Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** | NONE |
| **Objectives of the Course** | Students at this level can understand sentences and frequently-used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment).  Students can understand clear, slow, standard speech related to areas of most immediate personal relevance (e.g. very basic personal and family information, shopping, local geography and employment) and can catch the main point in short, clear, simple messages and announcements.  Students are able to read and understand short, simple texts containing high frequency vocabulary and shared international expressions.  Students can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar topics and activities.  They can write short, simple notes and messages relating to matters in areas of immediate need, linking a series of simple phrases and sentences with simple connectors like ‘and’ , ‘but’ and ‘because’. |
| **Short Course Content** | The aim of the course is to teach students basic grammar rules in elementary level, give them speaking, writing, reading and listening knowledge of English. It consists of content and activities aimed at having students acquire Beginner Level English language skills according to evaluation and reference system of The Common European Framework. |

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| **Learning Outcomes of the Course** | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| The student becomes familiar with basic grammar rules in  **1** English. | 1, 2, 3, 4 | 1, 5, 11 | A |
| **2** Analyzes English dialogues. | 1, 2, 3, 4 | 1, 4, 5, 11 | A |
| **3** Understands and explains an English text at the level. | 1, 2, 3, 4 | 1, 4, 5, 11 | A |
| **4** Communicates in written and spoken English. | 1, 2, 3, 4 | 1, 4, 5, 11 | A |
| **5** |  |  |  |

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| **Main Textbook** | Warwick L., Williams D. (2020). *Roadmap A2 Students’ Book & Workbook*. Pearson Education Limited. |
| **Supporting References** | Murphy, R., (2004). *English Grammar in Use*, Cambridge University Press, |
| **Necessary Course Material** | Computer, Webcam, Speakers; or Smart phone |

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| --- | --- |
| **Course Schedule** | |
| **1** | 1A: verb be – positive and negative - countries and nationalities  contractions with be introduce yourself - write an online message - using capital letters and full stops |
| **2** | 1B: questions with *be* question words intonation in questions ask and answer questions - understand a simple conversation understanding question words |
| **3** | 1C: *this, that, these* and those everyday objects - *this*, *these* talk about things for sale - understand adverts identifying specific information  1D: tell the time |
| **4** | 2A: possessive adjectives and possessive ’*s* family members possessive *’s* describe your family - understand a conversation about family - and, too and but  2B: *whose* and possessive pronouns - everyday objects 2 - possessive pronouns say who things belong to - understand online posts - understanding the important words |
| **5** | *2C: have got -* adjectives describing objects *have*/*has* describe objects English in action buy things in a shop buy things in a shop - write a review of a product using and, but and so  2D: buy things in a shop |
| **6** | 3A present simple with *I, you, we* and *they*; adverbs of frequency and time expressions - free-time activities  - talk about free-time Activities - write an online profile - using commas and apostrophes |
| **7** | 3B present simple with *he, she* and *it -* everyday activities - present simple with *he, she* and *it-* describe daily routines - understand a factual text - using headings to find information |
| **8** | Mid-Term Exam |
| **9** | 3C present simple questions free-time activities 2 *do*/*does* ask about free-time activities – understand short talks - understanding key words  3D buy tickets |
| **10** | 4A there is/are - places in a city - linking - talk about your city - write a description - using word order correctly  4B articles - things in a home - the - describe your home - understand social media posts - guessing new words |
| **11** | 4C need + noun, need + infinitive with to - equipment - weak forms - discuss what to take on a trip - understand a short radio programme - understanding weak forms  4D ask for information |
| **12** | 5A position of adjectives - appearance - tonic stress on adjectives - describe people’s appearance - write a description of a person - using paragraphs |
| **13** | 5B was/were - adjectives to describe experiences - weak forms of was/were - describe an experience - understand a story - linking between words |
| **14** | 5C can/can’t for ability - skills - can/can’t - describe your skills - understand information in a brochure - understanding it, they and them  5D make and respond to requests |
| **15** | |
| **15,16** | 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 | 1 | 14 |
| Homework | 1 | 2 | 2 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 4 | 4 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 6 | 6 |
|  | **Total workload** | | **72** |
| **Total workload / 30** | | **2,4** |
| **Course ECTS Credit** | | **2** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** |  |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Turkish Language I | 151911181 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 2 | 0 |  | 2 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  |  |  | √ |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | To show the richness of Turkish by informing students about the development and current situation of Turkish, to gain a national language awareness, to ensure that they can speak and write Turkish correctly. To compare Turkish language with major languages in the world. To compare the language policies of major languages with the language policy of Turkish language. To give speech training. |
| **Short Course Content** | Definition and properties of language; languages of the world and the place of Turkish among the world languages; historical development of Turkish language and the development of Western Turkish; Atatürk's studies and views on Turkish language; phonetics; spelling rules and punctuation; language policies. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The student explains the language families of the world and the place of Turkish among the world languages. | 5,3 | 1 | A |
| **2** | Defines the rules of Turkish. | 9 | 1, 5 | A |
| **3** | Recognizes sound events. | 8 | 1, 5, 11 | A |
| **4** | Applies spelling rules. | 7 | 5, 6 | A |
| **5** | Compose written and oral compositions. | 2,4 | 6 | A |
| **6** | Uses Turkish correctly. | 1,6 | 6, 11 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | *Türk Dili I-II*, ed. Ferruh Ağca, Eskişehir Osmangazi Üniversitesi Yayınları, 2022**.** |
| **Supporting References** | *Üniversiteler İçin Türk Dili*, Bayrak Yayınları, İstanbul, 1997. |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Definition of Language |
| **2** | Language-Nationality-Culture Relationship |
| **3** | World Languages and Turkish Language |
| **4** | Age of Turkish Language |
| **5** | Historical Development of Turkish Language |
| **6** | Alphabets Used in Turkish Writing |
| **7** | Writing Revolution |
| **8** | Mid-Term Exam |
| **9** | Phonetics of Turkish Language |
| **10** | Phonetics of Turkish Language |
| **11** | Morphology of Turkish Language |
| **12** | Morphology of Turkish Language |
| **13** | Word Groups |
| **14** | Word Groups |
| **15** | Word Groups |
| **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 | 2 | 28 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 4 | 4 | 16 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 4 | 4 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 4 | 4 |
|  | **Total workload** | | **56** |
|  | **Total workload / 30** | | **1,86** |
|  | **Course ECTS Credit** | | **2** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
|  |  |
|  |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Öğr. Gör. M. AKPINAR |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| INTRODUCTION TO METALLURGICAL AND MATERIALS ENGINEERING | 151911199 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 1 | 2 | 0 | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| **√** | **√** |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The aim is to introduce students to the historical development and current applications of Metallurgical and Materials Engineering, enable the students to understand the concepts and processes related to the field and to introduce their fields of study, and also to enable them to understand engineering responsibilities and ethical principles. |
| **Short Course Content** | Definition of Metallurgical and Materials Engineering, its importance, fields of study, development of materials throughout history, classification of materials (metallic materials, ceramic materials, polymers, composites), structure of materials (atomic and crystal structure, microstructure), properties of materials, processes applied to materials, production (metallic and non-metallic materials) and forming processes, characterization of materials,  quality control, material selection in engineering applications, economic and environmental issues, advanced materials and application examples, ethics in engineering. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Defines Metallurgical and Materials Engineering, explains the importance, fields of study of and the development of materials throughout history. | 1,8 | 1, 2, 5, 11 | A, B, K |
| **2** | Classifies material types. | 1, 2 | 1, 2, 5, 11 | A, B, K |
| **3** | Understands the structure and properties of materials. Explains the relationship between these concepts. | 1, 2, 6 | 1, 2, 5, 11 | A, B, K |
| **4** | Understands the production and shaping processes applied to materials. Gains knowledge about the effects of these processes on the structure and properties of materials. | 1, 2, 6, 13 | 1, 2, 5, 11, 13 | A, B, K |
| **5** | Defines the characterization methods of materials. Understands the importance of quality control in production processes. | 1, 2, 6, 12, 13 | 1, 2, 5, 11 | A, B, K |
| **6** | Gains knowledge about the types and application areas of new generation and advanced materials. | 1, 2, 6, 10, 13 | 1, 2, 5, 11, 13 | A, B, K |
| **7** | Understands materials selection procedure for various applications. | 1, 2, 6, 11, 13 | 1, 2, 5, 8, 11, 13 | A, B, K |
| **8** | Expresses engineering responsibility and ethical principles. | 1, 2, 9 | 1, 2, 5, 8 | A, B, K |

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| --- | --- |
| **Main Textbook** | William D. Callister, David G. Rethwisch, Malzeme Bilimi ve Mühendisliği (Materials Science and Engineering), 8. basımdan çeviri. |
| **Supporting References** | Electronic data bases |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Definition, importance and fields of study in Metallurgical and Materials Engineering |
| **2** | Historical development of materials |
| **3** | Structure of materials |
| **4** | Material types – Metals |
| **5** | Material types – Non-metallic materials |
| **6** | Mechanical properties of materials |
| **7** | Electrical, optical, thermal, magnetic properties and corrosion behavior of materials |
| **8** | Mid-Term Exam |
| **9** | Production and shaping of materials |
| **10** | Production and shaping of materials |
| **11** | Advanced materials |
| **12** | Characterization and quality control of materials |
| **13** | Material selection |
| **14** | Engineering ethics |
| **15** | Overview and discussion |
| **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 | 2 | 28 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 14 | 1 | 14 |
| Homework |  |  |  |
| Quiz Exam | 2 | 1 | 2 |
| Studying for Quiz Exam | 2 | 1 | 2 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 4 | 4 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 8 | 8 |
|  | **Total workload** | | **60** |
| **Total workload / 30** | | **2** |
| **Course ECTS Credit** | | **2** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 5 |
| Quiz | 5 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 3 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist. Prof. Dr. S. Mine Toker | Dr. Işın AKAY ERDOĞAN |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| OCCUPATIONAL HEALTH AND SAFETY I | 151911208 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 1 | 2 | 0 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  |  |  | √ |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Teach the methods of prevention of occupational accidents and diseases in the workplace. |
| **Short Course Content** | Occupational healthy and safety definition, importance, historical development and basic concepts of the subject, Occupational safety culture, OHS legislation, Hazard sources and classification, Occupational accidents, Occupational diseases, Impact on employees of the work environment (physical, chemical, psychosocial, etc. factors), Basic Occupational safety in workplaces, Risk assessment, Health and safety signs Personal protective Equipment (PPE),Fire, The relevant legislation |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | To improve the physical conditions of the workplace, develop alternative solutions and solving. | PO 9 |  |  |
| **2** | Potential risks in the workplace, assessment and development of solutions to protect human health | PO 11 |  |  |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | 1. Kahya, E., 2022, **İş Güvenliği**, ESOGÜ Yayın No :246, Eskişehir. 2. 6331 Sayılı İş Sağlığı ve Güvenliği Kanunu |
| **Supporting References** | 1. Yiğit, A., **İş Güvenliği**, 2013, Dora basım-Yayın Dağıtım Ltd. Şti, Bursa  2. Bayır, M. ve Ergül, M., 2006, **İş Güvenliği ve Risk Değerlendirme Uygulamaları**, Bursa.  3. Dizdar, E.N., 2008, İş Güvenliği, 4.Baskı, Murathan Yayınevi, Trabzon.  4. Esin, A., 2006, Yeni Mevzuatın Işığında İş Sağlığı ve Güvenliği, TMMO MMO Yayın No:MMO/363/2, Ankara. |
| **Necessary Course Material** | Computer, projection equipment, personal safety equipment |

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| **Course Schedule** | |
| **1** | Course scope, execution, evaluation  Occupational Safety (defines, importance, etc.) |
| **2** | Occupational Safety Culture |
| **3** | OHS legislation (law No:6331) |
| **4** | OHS legislation (law No: 6331) |
| **5** | Occupational accidents (agents, type, statistics) and basic safety precautions |
| **6** | Occupational accidents (agents, type, statistics) and basic safety precautions |
| **7** | Occupational diseases |
| **8** | Mid-Term Exam |
| **9** | Basic safety rules in workplaces. |
| **10** | Risk Factors |
| **11** | Risk Factors |
| **12** | Risk Assesment |
| **13** | Risk Assesment & Health and safety signs |
| **14** | Personal Protective Equipment (PPE) |
| **15** | Fire |
| **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 | 2 | 28 |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 10 | 10 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 15 | 15 |
|  | **Total workload** | | **55** |
|  | **Total workload / 30** | | **1.8** |
|  | **Course ECTS Credit** | | **2.0** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 2 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 1 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 4 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 5 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Yaşar KESER |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Physical Chemistry |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 2 | 3 | 0 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The Physical Chemistry course aims to teach students basic gas laws and the fundamentals of thermodynamics to create the necessary knowledge in professional fields and enable students to use course skills in problem-solving. |
| **Short Course Content** | Gasses, liquids and solids.  First, second and third law of thermodynamics. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learns the fundamentals of physical chemistry | 1,2 | 1,5,10 | A,B,K |
| **2** | Gain knowledge about gases and basic gas laws. | 1,2 | 1,5,8,10 | A,B,K |
| **3** | Explain the basic terms and definitions of thermodynamics | 1,2 | 1,5 | A,B,K |
| **4** | Calculate changes in enthalpy, entropy, and Gibbs free energy as a function of temperature and pressure. | 1,2 | 1,5,8,10 | A,B,K |
| **5** | Express equilibrium and equilibrium conditions | 1,2 | 1,5 | A,B,K |
| **6** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Fizikokimya, P.W.Atkins, Bilim Yayıncılık,2001 |
| **Supporting References** | Fizikokimya, Yüksel Sarıkaya, Gazi Kitapevi, 2008  Fizikokimya, Problem Çözümleri Y. Sarıkaya, Gazi Kitabevi, 2008  Fizikokimya, R.G Martinner, Palme Yayıncılık,2004 |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Fundamental Laws of Chemistry, System and State Variables, Matter and Energy |
| **2** | Properties of Gases |
| **3** | Ideal Gas Law |
| **4** | Ideal Gas Law, Ideal Gas Mixttures |
| **5** | Real Gases |
| **6** | The First Law of Thermodynamic;Work, Heat, Energy |
| **7** | The First Law of Thermodynamic;Work, Heat, Energy |
| **8** | Mid-Term Exam |
| **9** | The Second Law of Thermodynamics |
| **10** | Entalpy |
| **11** | Entalpy |
| **12** | Entropy |
| **13** | Entropy |
| **14** | Gibbs Free Energy |
| **15** | Chemical Equilibrium |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 | 2 | 1 | 2 |
| 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) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1,5 | 1,5 |
| Studying for Mid-Term Exam | 1 | 10 | 10 |
| Final Exam | 1 | 1,5 | 1,5 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **113** |
|  | **Total workload / 30** | | **3,76** |
|  | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 5 |
| Homework | 5 |
| Bir öğe seçin. |  |
| Bir öğe seçin. | 50 |
| **Final Exam** | 100 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | |
| **Prepared by** | Assoc. Prof. Dr. Alanur BİNAL AYBAR |  |  |
| **Signature(s)** |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Calculus II | 151912193 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 4 | 0 | 4 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| ✓ |  |  |  |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequieite(s)** |  |
| **Course Objectives** | To introduce multivariable functions and multiple integrals and to teach the calculation of areas and volumes with their help. |
| **Course Description** | Sequences and series, vector valued functions, multivariable functions, multiple integrals and their applications |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Solves multivariable function, limit, continuity and derivative problems. | 1a | 1,5 | A |
| **2** | Knows the relationship between perpendicular, polar, cylindrical and spherical coordinates, and the concepts of area and volume elements and uses them in practice. | 1a | 1,5 | A |
| **3** | Combines the distribution of physical quantities with the concepts of scalar and vector fields. | 1a | 1,5 | A |
| **4** | Physically interprets mathematical definitions of scalar and vector fields. | 1a | 1,5 | A |
| **5** | Gains skills in the mathematical structure, physical equivalents and solutions of multiple integrals. | 1a | 1,5 | A |
| **6** |  |  |  |  |
| **7** | c |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Balcı, M., 2010, Genel Matematik 2, Balcı Yayınları, Ankara. |
| **Other References** | 1. Koçak, M, Genel Matematik, “Diferensiyel ve İntegral Hesap”. 2. Balcı, M., 2009, Genel Matematik Problemleri 2, Balcı Yayınları, Ankara. |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Sequences and series |
| **2** | Vector functions |
| **3** | Functions of several variables, limits and continuities of them |
| **4** | Partial derivatives and chain rules |
| **5** | Derivative of implicit functions and Directional derivative |
| **6** | Double integrals and region transformations |
| **7** | Review |
| **8** | **MIDTERM** |
| **9** | Finding volumes and areas by double integration |
| **10** | Finding volumes and areas by double integration |
| **11** | Finding mass and center of gravity by double integration |
| **12** | Calculating the volume and moment of inertia of a solid of revolution with double integrals |
| **13** | Triple integrals and region transformations |
| **14** | Applications of triple integrals (calculation of volume, mass, moment of inertia) |
| **15** | Applications of triple integrals (calculation of volume, mass, moment of inertia) |
| **16,17** | **FINAL EXAM** |

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| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 4 | 56 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 3 | 42 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1.5 | 1.5 |
| Midterm Exam preparation | 1 | 20 | 20 |
| Semester final exam | 1 | 1.5 | 1.5 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **141** |
|  | **Total workload / 30** | | **4.47** |
|  | **Course ECTS Credits** | | **5** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Quiz |  |
| Homework |  |
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| **Semester 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** |  |  |  |  |
| **Signature** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| PHYSICS II | 151912183 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 3 | 0 | 3 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| ✓ |  |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** | none |
| **Objectives of the Course** | To teach the basic laws and concepts of physics and to give various applications in daily life. |
| **Short Course Content** | Electric Charges, Coulomb's Law, Electric Field, Electric Potential, Capacitors and Dielectric Materials, Resistance and Electric Current, Magnetic Field, Magnetic Field Sources, Faraday's Law of Induction. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Explains the basic laws and concepts of Electricity and Magnetism. | PO1, PO2, PO6 | 1 | A |
| **2** | The student recognizes and solves various problems of physical systems in practice. | PO2, PO3,PO4, PO5 | 1 | A |
| **3** | Applies physical systems in daily life. | PO7, PO8,PO9, PO10 | 1 | A |
| **4** |  |  |  |  |

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| **Main Textbook** | "1. Halliday, D., Resnick, R., and Walker, J. (2008). Fundamentals of Physics (8th Edition). John Wiley & Sons, Inc.2.  Serway, R.A., Beichner, R.J., Physics For Scientists and Engineers with Modern Physics (2007), Harcourt College Publishers." |
| **Supporting References** | "1. Young, H.D, Freedman, R.A. (2006). University Physics Volume1 (12th Edition). Pearson/Addison Wesley 2.Ohanian, H.C. (1989). Physics (2nd Edition) New York: W.W. Norton & Company, Inc.3.  Giancoli, D.C. (2004). Physics: Principles with Applications (6th Edition). Pearson Education Inc." |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Electric Charges, Coulomb's Law |
| **2** | Electric field |
| **3** | Electric Potential |
| **4** | capacitors |
| **5** | Dielectric Materials |
| **6** | Electrical current |
| **7** | Electrical Work and Power |
| **8** | Mid-Term Exam |
| **9** | Kirchoff's Laws |
| **10** | Kirchoff's Laws |
| **11** | Multistage Circuits |
| **12** | Magnetic Field |
| **13** | Magnetic Field Sources |
| **14** | Faraday's Law of Induction |
| **15** | Faraday's Law of Induction |
| **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 | 1 | 14 |
| Homework | 5 | 1 | 5 |
| 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 | 1 |
| Studying for Mid-Term Exam | 7 | 3 | 21 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 14 | 1 | 14 |
|  | **Total workload** | | **99** |
|  | **Total workload / 30** | | **99/30** |
|  | **Course ECTS Credit** | | **3** |

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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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Asst. Prof. Dr. Şadiye Meral ÇAKMAK |  |  |  |
| **Signature(s)** |  |  |  |  |

** ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| PHYSICS II LAB |  |

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| **Semester** | **Number of Course Hours per Week** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 0 | 2 | 1 | 2 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Teaching through conducting experiments on the topics related to the content of Physics II; hence, enhancing the students’ perception and understanding on the important concepts and fundamental laws of electricity and magnetism. |
| **Short Course Content** | Numerical analysis and error calculation, fundamental measurements and Ohm's law, electrolysis, magnetic force, Ohm’s law, electric field lines, Kirchhoff’s rules and Wheatstone Bridge, alternating current circuits, transformers. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | To enhance observational and analytical skills. | 1, 2, 11 | 13 | C |
| **2** | Make measurements with common instruments. | 4, 5 | 3 | I |
| **3** | To be able to analyze quantitative information and errors. | 5, 6 | 15 | E |
| **4** | To be able to represent experimental data by using graphics. | 2, 5 | 15 | E |
| **5** | To be able to compare experimental results with mathematical and physical models, hence make an interpretation. | 5 | 8 | E |
| **6** | Prepare a lab report. | 1, 2, 4, 5, 6 | 15 | E |
| **7** | Develop teamwork skills.. | 6 | 12 | C, E, I, K |
| **8** | Learning how to run essential measurement devices such as voltmeter, ammeter, signal generator, and oscilloscope. Comprehend the working principles of circuit components. Understanding the pivotal relationship between electricity and magnetism. | 1, 2, 4, 5 | 3 | A, I |
| **9** | Encourage the curiosity for physics and improve the ability to apprehend the solid correlations between physics and engineering applications. | 1 | 11 | I |
| **10** | To obtain knowledge and experience on building basic experimental set ups upon need. | 2, 3, 4 | 3, 6, 10 | I |

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| **Main Textbook** | Physics II Experiments Laboratory Book, Eskişehir: Eskişehir Osmangazi Üniversitesi Yayınları, Sertaç Eroğlu, Murat Kellegöz, Gökhan Kılıç, Halil Yasin Adıyaman |
| **Supporting References** | Halliday, D., Resnick, R., and Walker, J. (2008). Fundamentals of Physics (8th Edition). John Wiley & Sons, Inc. Serway, R.A., Beichner, R.J.,  Serway, R.A., Beichner, R.J., Physics For Scientists and Engineers with Modern Physics (2007), Harcourt College Publishers |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Introduction to laboratory, and formation of lab groups. |
| **2** | Electrolysis experiment. |
| **3** | Basic measurements and Ohm’s Law Experiment. |
| **4** | Ohm’s Law experiment |
| **5** | Wheatstone Bridge experiment |
| **6** | Equipotential and electric field lines experiment |
| **7** | Equipotential and electric field lines experiment |
| **8** | Mid-Term Exam |
| **9** | Magnetic force experiment |
| **10** | Biot-Savart Law Experiment |
| **11** | Transformers experiment |
| **12** | Resonance in Wire experiment |
| **13** | Resonance tube and standing waves experiment |
| **14** | Resonance tube and standing waves experiment |
| **15** | Make up experiment, general review and preparation for final exam. |
| **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) | 2 | 1 | 2 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 2 | 1 | 2 |
| Homework |  |  |  |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 10 | 4 | 40 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 14 | 14 |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credit** | | **2** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term |  |
| Quiz |  |
| Homework |  |
| Report | 50 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** |  |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Economy | 151912112 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 2 | 3 | 0 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Micro-economic foundations of economics terms, within the framework of general laws, and to communicate to students the basic concepts of economics, micro thinking skills students able to acquire. |
| **Short Course Content** | Subject and method of economics, economic problem, Introduction to the theory of price, demand and supply; market equilibrium, at price and quantity changes, price elasticity of demand, cross-elasticity of demand, the income elasticity of demand, the flexibility of supply, in balance of flexibility and market practices, the concept of benefit and consumer equilibrium,, production function and law of diminishing returns, cost analysis; short-and long- competitive market the balance of firms, conditions of imperfect competition markets and monopol, factor markets; in factor markets, demand and supply, factor prices and incomes; labor and wage, land and rent, capital and interest, enterprise and profit. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Define economics and micro economics and macro economics to evaluate the separation. | 1, 6, 9, 10 | 1, 5, 8, 10 | A |
| **2** | With the general laws of economic events and interpret the basic concepts of micro-economics. | 1, 6, 9, 10 | 1, 5, 8, 10 | A |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | K.YILDIRIM ed. İktisada Giriş, Pelikan Yayıncılık, Ankara, 2013 |
| **Supporting References** | Zeynel DİNLER, İktisada Giriş, Ekin Kitabevi, 2002, Bursa.  Erdal M. ÜNSAL, Mikro İktisada Giriş, Turhan Kitabevi, Ankara, 2004. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Subject of economics, methodology and basic concepts. |
| **2** | Law of Scarcity, alternative cost, general terms, the basic economic problems and solutions of different economic orders. |
| **3** | The theory of consumer behavior, supply and demand, equilibrium price formation at the perfect competitive market, |
| **4** | Supply and demand factors affecting the outside of the commodity price, supply demand and flexibility analysis, |
| **5** | Supply and Demand Applications: Base price, ceiling price, Quantity Controls, Taxation, Producer and Consumer Surplus |
| **6** | The production function and cost analysis |
| **7** | Company balance and profit maximization, the balance of firms in the fully competitive market. |
| **8** | Mid-Term Exam |
| **9** | İmperfect Market: Monopoly, Oligopoly, Monopolistic Competition Markets |
| **10** | Macro Economics: Definition, Scope and Development |
| **11** | Measurement of Economic Performance: Unemployment, Inflation and Total Revenue |
| **12** | Measurement of Economic Performance: Unemployment, Inflation and Total Revenue |
| **13** | Basic Macroeconomic Variables and Concepts. (How to measure How to Interpret) |
| **14** | Money and Banking |
| **15** | Review |
| **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 |  |  |  |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **121** |
|  | **Total workload / 30** | | **4.03** |
|  | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 60 |
| **Total** | 100 |

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| **DERSİN ÖĞRENİM ÇIKTILARININ PROGRAM ÇIKTILARI (PÇ) İLE OLAN İLİŞKİSİ**  (5: Çok yüksek, 4: Yüksek, 3: Orta, 2: Düşük, 1: Çok düşük,) | | |
| **NO** | **PROGRAM ÇIKTISI** | **Katkı** |
| **1** | Matematik, fen bilimleri ve Metalurji ve Malzeme Mühendisliği ile ilgili mühendislik konularında yeterli bilgiye sahip olma; bu alanlardaki kuramsal ve uygulamalı bilgileri ve mühendislik problemlerini modelleme ve çözme için uygulayabilme becerisi. | 3 |
| **2** | Uygun analiz ve modelleme yöntemlerini seçip uygulayarak karmaşık mühendislik problemlerini saptama, tanımlama, formüle etme ve çözme becerisi. | 2 |
| **3** | Modern tasarım yöntemlerini uygulayarak karmaşık bir sistemi, süreci, cihazı veya ürünü gerçekçi kısıtlar ve koşullar altında, belirli gereksinimleri karşılayacak şekilde tasarlama becerisi. | 2 |
| **4** | Metalurji ve Malzeme Mühendisi olarak karşılaşılan mühendislik uygulamaları için gerekli olan modern teknik ve araçları geliştirme, seçme ve kullanma becerisi; bilişim teknolojilerini etkin bir şekilde kullanma becerisi. | 1 |
| **5** | Mühendislik problemlerinin incelenmesi için deney tasarlama, deney yapma, veri toplama,  sonuçları analiz etme ve yorumlama becerisi. | 1 |
| **6** | Bireysel çalışma, disiplin içi ve disiplinler arası etkin biçimde çalışabilme becerisi. | 5 |
| **7** | Türkçe sözlü ve yazılı etkin iletişim kurma becerisi; en az bir yabancı dil bilgisi. | 5 |
| **8** | Yaşam boyu öğrenmenin gerekliliği bilinci; bilgiye erişebilme, bilim ve teknolojideki gelişmeleri izleme ve kendini sürekli yenileme becerisi. | 4 |
| **9** | Mesleki ve etik sorumluluk bilinci. | 5 |
| **10** | Proje yönetimi ile risk yönetimi ve değişiklik yönetimi gibi iş hayatındaki uygulamalar hakkında bilgi; girişimcilik, yenilikçilik ve sürdürebilir kalkınma hakkında farkındalık. | 2 |
| **11** | Mühendislik uygulamalarının evrensel ve toplumsal boyutlarda sağlık, çevre ve güvenlik üzerindeki etkileri ile çağın sorunları hakkında bilgi; mühendislik çözümlerinin hukuksal sonuçları konusunda farkındalık. | 3 |
| **12** | Mühendislik uygulamalarında, malzeme seçimi, ürün geliştirme ile üretim süreçlerinde kalite bilinci  ve kalite-kontrol ile sürdürülebilirlik alanlarında farkındalık. | 3 |
| **13** | Mühendislik uygulamalarında karşılaşılan sorunlara özgüvenle yaklaşma becerisi. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Asst. Prof. Dr. Derviş Tuğrul KOYUNCU |  |  |  |
| **Signature(s)** |  |  |  |  |

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**ESOGU METALLURRGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| English II | 51012212 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 2 | 3 | 0 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Associate degree / Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** | NONE |
| **Objectives of the Course** | Students can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. They can describe in simple terms aspects of their background, immediate environment and matters in areas of immediate need.  Students can understand standard speech related to areas of most immediate personal relevance (e.g. personal and family information, shopping, local geography and employment) and can catch the main point in simple messages and announcements.  Students can read and find specific, predictable information in simple everyday material such as advertisements, prospectuses and timetables.  Students can handle very short social exchanges, even though they cannot usually keep the conversation going of their own accord.  They can write relating to matters in areas of immediate need, linking a series of phrases and sentences with connectors. |
| **Short Course Content** | The aim of the course is to teach students basic grammar rules in elementary level, give them speaking, writing, reading and listening knowledge of English. It consists of content and activities aimed at having students acquire Elementary Level English language skills according to evaluation and reference system of The Common European Framework. |

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| **Learning Outcomes of the Course** | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| The student becomes familiar with basic grammar rules in  **1** English. | 1, 2, 3, 4 | 1, 5, 11 | A |
| **2** Analyzes English dialogues. | 1, 2, 3, 4 | 1, 4, 5, 11 | A |
| **3** Understands and explains an English text at the level. | 1, 2, 3, 4 | 1, 4, 5, 11 | A |
| **4** Communicates in written and spoken English. | 1, 2, 3, 4 | 1, 4, 5, 11 | A |

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| --- | --- |
| **Main Textbook** | Warwick L., Williams D. (2020). *Roadmap A2 Students’ Book & Workbook*. Pearson Education Limited. |
| **Supporting References** | Murphy, R., (2004). *English Grammar in Use*, Cambridge University Press, |
| **Necessary Course Material** | Computer, Webcam, Speakers; or Smart phone |

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| --- | --- |
| **Course Schedule** | |
| **1** | 6A past simple (regular verbs) - prepositions - describe an event - understand reviews - understanding adjectives  6B past simple (irregular verbs) - describe a good weekend - understand a narrative - understanding the order of events |
| **2** | 6C past simple (questions) - verbs + prepositions - did you? - ask and answer questions - write a short story - using subject pronouns  6D give and accept an apology |
| **3** | 7A countable and uncountable nouns; some, any, lots of and a lot of - food and drink - vowel sounds; connected speech - describe food shopping items - understand announcements - listening for special information |
| **4** | 7B how much/how many? + quantifiers – food containers - sentence stress - create a dish - write a social media post - giving opinions and reasons |
| **5** | 7C comparative adjectives - describing places to eat - compare places to eat - follow instructions - understanding instructions  7D order in a café |
| **6** | 8A present continuous - geography -ing - describe a travel experience - write a guide - using adjectives  8B present simple and present continuous - weather - contractions - describe the weather - understand a news report - understanding connected speech |
| **7** | 8C superlative adjectives - phrases describing travel - compare places, activities and transport - understand a short article - understanding paragraph topics  8D make a phone call |
| **8** | Mid-Term Exam |
| **9** | 9A should/shouldn’t - health - give advice - understand a short talk - dealing with unknown words |
| **10** | 9B be going to - future plans - discuss your goals for the future - write an informal email - organising an email to a friend |
| **11** | 9C would like/want - activities with go - tonic stress; weak forms - describe what you want to do - understand a blog post - understanding because and so  9D make arrangements and invitations |
| **12** | 10A verb patterns - housework - sentence stress - interview people - write a personal profile - expressing likes and dislikes |
| **13** | 10B have to/don’t have to - clothes - word stress; have to - play a guessing game - understand an opinion article - identifying opinions |
| **14** | 10C present perfect simple - technology - contractions - talk about past experiences - understand an interview  - understanding time expressions 10D give a compliment |
| **15** | |
| **15,16** | 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 | 1 | 14 |
| Homework | 1 | 2 | 2 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 4 | 4 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 6 | 6 |
|  | **Total workload** | | **72** |
| **Total workload / 30** | | **2,4** |
| **Course ECTS Credit** | | **2** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** |  |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Turkish Language II | 151912182 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 2 | 0 |  | 2 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  |  |  | √ |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | To show the richness of Turkish by informing students about the development and current situation of Turkish, to gain a national language awareness, to ensure that they can speak and write Turkish correctly. To compare Turkish language with major languages in the world. To compare the language policies of major languages with the language policy of Turkish language. To give speech training. |
| **Short Course Content** | Definition and properties of language; languages of the world and the place of Turkish among the world languages; historical development of Turkish language and the development of Western Turkish; Atatürk's studies and views on Turkish language; phonetics; spelling rules and punctuation; language policies. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The student explains the language families of the world and the place of Turkish among the world languages. | 5,3 | 1 | A |
| **2** | Defines the rules of Turkish. | 9 | 1, 5 | A |
| **3** | Recognizes sound events. | 8 | 1, 5, 11 | A |
| **4** | Applies spelling rules. | 7 | 5, 6 | A |
| **5** | Compose written and oral compositions. | 2,4 | 6 | A |
| **6** | Uses Turkish correctly. | 1,6 | 6, 11 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | *Türk Dili I-II*, ed. Ferruh Ağca, Eskişehir Osmangazi Üniversitesi Yayınları, 2022**.** |
| **Supporting References** | *Üniversiteler İçin Türk Dili*, Bayrak Yayınları, İstanbul, 1997. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Elements of a Sentence |
| **2** | Elements of a Sentence |
| **3** | Sentence Types |
| **4** | Sentence Types |
| **5** | Punctuation Marks |
| **6** | Punctuation Marks |
| **7** | Punctuation Marks |
| **8** | Mid-Term Exam |
| **9** | Written Expression |
| **10** | Written Expression |
| **11** | Oral Expression |
| **12** | Oral Expression |
| **13** | Spelling Rules |
| **14** | Spelling Rules |
| **15** | Expression Disorders |
| **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 | 2 | 28 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 4 | 4 | 16 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 4 | 4 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 4 | 4 |
|  | **Total workload** | | **56** |
|  | **Total workload / 30** | | **1,86** |
|  | **Course ECTS Credit** | | **2** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
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| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** |  |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Information Technologies | 151912195 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 2 | 2 | 2 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | To introduce the basic information technology concepts and applications and to use these skills during their undergraduate studies |
| **Short Course Content** | Basic information technology concepts, hardware, Windows operating systems, software, application of Office programmes (MS Word, Excel, PowerPoint, Access), Database concepts, Internetworking |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Be able to operate basic information technology equipment safely | 1, 2, 4, 8 | 1, 2, 5, 6 | A, C, K |
| **2** | Have an understanding of fundamental theory in the area of information technology and computer applications and introductory level | 1, 2, 4 | 1, 2, 5, 6 | A, C, K |
| **3** | Be able to use hardware and standard computer applications | 2, 4, 13 | 1, 2, 5, 6 | A, C, K |
| **4** | Be able to use software and programming | 2,4 | 1, 2, 5, 6 | A, C, K |
| **5** | Be able to prepare presentations, write reports by using Office programs | 4, 7, 13 | 1, 2, 5, 6 | A, C, K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Windows7-Office 2010, Ömer Bağcı, Seçkin Yayınevi, 2010 |
| **Supporting References** | Bilgisayarın B’si, Ömer Bağcı, Seçkin Yayınevi, 2010 |
| **Necessary Course Material** | Computer |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Basic information technology concepts |
| **2** | Hardware |
| **3** | Virus removal softwares |
| **4** | Windows operating systems |
| **5** | Windows operating systems |
| **6** | MS Word |
| **7** | MS Word |
| **8** | Mid-Term Exam |
| **9** | MS Word |
| **10** | MS Excel |
| **11** | MS Excel |
| **12** | MS Excel |
| **13** | MS Excel |
| **14** | MS PowerPoint |
| **15** | MS PowerPoint |
| **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 | 4 | 56 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 14 | 4 | 56 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 10 | 10 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **144** |
|  | **Total workload / 30** | | **4,8** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | - |
| Homework |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 60 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 5 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc.Prof.Dr. Bilge YAMAN ISLAK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Computer Aided Drawing | 151912196 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 2 | 2 | 2 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ | √ | √ |  |

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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** | Learning and gaining ability for using digital design software at computer to make 2D and 3D drawings and designs. |
| **Short Course Content** | Knowledge about computer aided drawings softwares, using computer for project design and applications, learning basic instructions and making 2D drawings with using these instructions, gaining knowledge and ability to make 3D drawings. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Using the CAD softwares | 3, 4, 5, 6, 8 | 1, 4, 6, 11 | A, C, D, K |
| **2** | The transfering of drawings of prejects to the computer | 3, 4, 5, 6, 8 | 1, 4, 6, 11 | A, C, D, K |
| **3** | Desinging using CAD softwares and creating presentation files of projects | 3, 4, 5, 6, 8 | 1, 4, 6, 11 | A, C, D, K |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Bora,H. Şen İ.Z., Bilgisayar Destekli Çizim ve Tasarım DE-HA, İstanbul, |
| **Supporting References** | Şen, İ.Z., Teknik Resim – Temel Bilgiler, DE-HA, İstanbul, 2002 |
| **Necessary Course Material** | Computer Lab, CAD software |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Fundamentals of Computer Aided Drawing, Introduction to CAD |
| **2** | Presentation of drawing display (interface), Presentation of status bar and applications |
| **3** | Presentation of drawing instructions |
| **4** | Presentation of drawing instructions |
| **5** | Presentation of drawing instructions |
| **6** | Presentation of drawing instructions |
| **7** | Presentation of editing instructions |
| **8** | Mid-Term Exam |
| **9** | Presentation of editing instructions |
| **10** | Presentation of options of object status bar |
| **11** | Properties of layers and setting, Techniques for scaling |
| **12** | Converting files and drawings from different formats to CAD |
| **13** | Presentation of plot and export properties |
| **14** | Printing |
| **15** | Printing |
| **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 | 4 | 56 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 14 | 4 | 56 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 10 | 10 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **144** |
|  | **Total workload / 30** | | **4,8** |
|  | **Course ECTS Credit** | | **5** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 30 |
| Homework |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 40 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 3 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 5 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. İbrahim ÇELİKYÜREK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

COURSE INFORMATION FORM

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| --- | --- |
| **Course Name** | **Course Code** |
| MATERIALS I | 151913555 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 5 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| **√** | **√** |  |  |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Learning fundamental materials science concepts; understanding the effect of structure on determining material properties; establishing the relationships between concepts such as the processes applied to materials for tailoring material structure and properties in order to obtain the desired performance. |
| **Short Course Content** | Atomic structure of materials and interatomic bonds, crystal structure of materials, defects in solids, deformation of materials, mechanical properties of materials, strengthening mechanisms in metals, failure. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understands the importance of materials science and classifies materials. | 1, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **2** | Learns the atomic structure of materials and interatomic bonds, and understands the relationship of these concepts with material properties. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **3** | Understands the crystal structure of materials, analyzes index systems and crystal structure-related calculations. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **4** | Learns and classifies structural defects and their types in solids. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **5** | Learns the deformation of materials and the concepts of elastic and plastic deformation, and defines the relationship between deformation and material structure. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **6** | Defines the concept of mechanical properties, learns mechanical testing methods, defines mechanical properties measured by different test methods. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **7** | Establishes the relationship between mechanical properties  and atomic bonds and crystal structure, and explains it through the concept of deformation. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **8** | Learns the strengthening mechanisms in metals and explains their connection with crystal structure defects. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **9** | Learns the concept of damage, understands ductile and brittle fracture mechanisms, and explains its importance. | 1, 4, 6, 8, 11 | 1, 2, 5, 8, 11 | A, B, K |

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| **Main Textbook** | William D. Callister, David G. Rethwisch, Malzeme Bilimi ve Mühendisliği (Materials Science and Engineering), 8. basımdan çeviri. |
| **Supporting References** | * H. Uzun, Mühendisler için Malzeme Biliminin Temel İlkeleri, 1. basım. * James F. Shackelford, Mühendisler için Malzeme Bilimine Giriş, 8. basımdan çeviri. * Ashby, M., Shercliff, H., Cebon, D., Materials: engineering, science, processing, and design, 2. veya 3. basım. |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Explaining the purpose and content of the course: Introduction to materials science. |
| **2** | Atomic structure of materials and interatomic bonds |
| **3** | Crystal structure of materials: Basic concepts, crystal structure of metals, crystal structure calculations |
| **4** | Crystal structure of materials: Crystal lattice points, directions and planes (index systems) |
| **5** | Crystal structure of materials: Non-metal crystalline and amorphous materials; polymorphism, allotropy, anisotropy; characterization of crystal structures |
| **6** | Imperfections in solids: Point defects, linear defects (dislocations), interface defects |
| **7** | Deformation of materials: Elastic and plastic deformation concepts; deformation of metals, deformation of non-metal materials |
| **8** | Mid-Term Exam |
| **9** | Mechanical properties of materials: Tensile test, stress-strain curve, determination of mechanical properties from stress-strain curves |
| **10** | Mechanical properties of materials: Stress-strain curve of metals and non-metallic materials, other forms of deformation (compression, shear, torsion), hardness |
| **11** | Mechanical properties of materials: Fatigue, impact, creep tests |
| **12** | Strengthening mechanisms in metals: Grain size reduction; solid solution hardening, precipitation hardening |
| **13** | Strengthening mechanisms in metals: Strain ardening, recovery, recrystallization and grain growth |
| **14** | Failure: Fundamentals of fracture, ductile and brittle fracture; fracture toughness; design and safety factors |
| **15** | Overview |
| **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 | 1 | 2 |
| Studying for Quiz Exam | 2 | 6 | 12 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 14 | 14 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **136** |
| **Total workload / 30** | | **4,53** |
| **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 5 |
| Quiz | 5 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist. Prof. Dr. S. Mine Toker |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Metallurgical Thermodynamics I | 151913205 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 5 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | To understand the fundamental laws and principles of thermodynamics, to comprehend the applications of thermodynamic laws in closed systems |
| **Short Course Content** | Some definitions and terms; mathematical expressions; the first law of thermodynamics; internal energy; enthalpy; heat capacity; the second law of thermodynamics; entropy; reversible and irreversible processes; Maxwell relations; behavior of gases; Ellingham diagrams; phase equilibrium in two-phase systems |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understanding the relationship between work and heat | 1, 2 | 1 | A, B |
| **2** | Applications of heat calculations in metallurgical processes | 1, 2 | 1 | A, B |
| **3** | Spontaneous processes and their applications in metallurgical operations | 1, 2 | 1 | A, B |
| **4** | Phase equilibrium in two-phase systems | 3, 4 | 1 | A, B |
| **5** | Understanding Ellingham diagrams | 3, 4 | 1 | A, B |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
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| **Main Textbook** | David Gaskell & David E. Laughlin, Introduction to the Thermodynamics of Materials, CRC Press, 2017 |
| **Supporting References** | Süheyla Aydın, Metalurji ve Malzeme Mühendisleri İçin Termodinamik, Literatür,2014 |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | General Definitions and Concepts |
| **2** | First Law of Thermodynamics |
| **3** | Heat Capacity |
| **4** | Enthalpy Calculation |
| **5** | Enthalpy Calculation in Chemical Reactions |
| **6** | Enthalpy Calculation in Chemical Reactions |
| **7** | Second Law of Thermodynamics |
| **8** | Mid-Term Exam |
| **9** | Entropy Calculation in Chemical Reactions |
| **10** | Applications of the First and Second Laws to Ideal Gases – Auxiliary Functions and Maxwell Equations |
| **11** | Thermodynamics of Gases – Ideal Gases |
| **12** | Thermodynamics of Gases – Non-Ideal Gases |
| **13** | Phase Equilibrium in Single-Phase Systems |
| **14** | Solid Phase Gas Reactions – Introduction to Ellingham Diagrams |
| **15** | Ellingham Diagrams and Their Uses in Metallurgical Processes |
| **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 | 1 | 2 |
| Studying for Quiz Exam | 2 | 6 | 12 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 12 | 12 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **139** |
|  | **Total workload / 30** | | **4,63** |
|  | **Course ECTS Credit** | | **5** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 5 |
| Quiz | 5 |
|  |  |
|  |  |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr.  Alanur Binal AYBAR | Dr.  Reşat Can ÖZDEN |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Differantial Equations | 151913556 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | **√** |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Introduce the basic concepts required to understand, construct, solve and interpret differential equations.  Teach methods to solve differential equations of various types. |
| **Short Course Content** | First-Order Differential Equations, Application of First-Order Differential Equations, Linear Differential Equations with Constant Coefficients, Systems of linear differential equations, Euler differential equations |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Classify differential equations according to certain features. | 1, 2, 3 | 1, 5 | A |
| **2** | Solve first order linear equations and nonlinear equations of certain types and interpret the solutions | 1, 2, 3 | 1, 5 | A |
| **3** | Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions. | 1, 2, 3 | 1, 5 | A |
| **4** | Applies differential equations to model engineering problems. | 1, 2, 3 | 1, 5 | A |
| **5** | Solve systems of linear differential equations. | 1, 2, 3 | 1, 5 | A |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | Richard Bronson**,**  Schaum’s Outlines Differential Equations. McGraw Hill-Nobel |
| **Supporting References** | Özer N. Ve Eser D., Diferansiyel Denklemler, Eskişehir, 2002 Mathematical Handbook of Formulas and Tables, Murray R. Spiegel |
| **Necessary Course Material** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Schedule** | | | | |
| **1** | Classifications of First-Order Differential Equations, Separable First-Order Differential Equations | | | |
| **2** | Homogeneous Differential Equations | | | |
| **3** | Exact Differential Equations, Integraling Factor | | | |
| **4** | Linear First-Order Differential Equations | | | |
| **5** | Application of First-Order Differential Equations | | | |
| **6** | Linear Differential Equations: Theory of Solutions | | | |
| **7** | Linear Differential Equations with Constant Coefficients | | | |
| **8** | Mid-Term Exam | | | |
| **9** | The Method of Undetermined Coefficients | | | |
| **10** | Variation of Parameters | | | |
| **11** | Variation of Parameters | | | |
| **12** | Operation Method | | | |
| **13** | Systems of linear differential equations | | | |
| **14** | Euler differential equations | | | |
| **15** | Euler differential equations | | | |
| **16,17** | Final Exam | | | |
| **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 | |  |  |  |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | | 1 | 15 | 15 |
| Final Exam | | 1 | 2 | 2 |
| Studying for Final Exam | | 1 | 20 | 20 |
|  | | **Total workload** | | **123** |
|  | | **Total workload / 30** | | **4.1** |
|  | | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 50 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam.** | 50 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 1 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 1 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| --- | --- | --- | --- | --- |
| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Mesut TEKKALMAZ |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Engineering Mechanics | 151913557 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| ✓ | ✓ |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The aim is to convey to students the fundamental principles of mechanics and examples of their applications in engineering. Additionally, it is intended to enable students to develop the ability to analyze mechanical problems in a simple and logical manner and to effectively apply a small number of well-understood fundamental principles for solving these problems. |
| **Short Course Content** | The engineering mechanics course includes topics such as the fundamental principles of statics, the analysis of force systems in planes and in space, the examination of solid bodies and force equilibrium systems, friction, and the basic principles of dynamics. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Ability to calculate the resultant of static forces. | 1, 2 | 1, 5, 10 | A |
| **2** | Ability to calculate the reaction forces at the supports of rigid bodies using the principles of equilibrium under static forces. | 1, 2 | 1, 5, 10 | A |
| **3** | Ability to calculate the axial forces in truss elements and the joint forces in frames using the principles of equilibrium under static forces. | 1, 2 | 1, 5, 10 | A |
| **4** | Ability to calculate the internal forces in simple and continuous beams under static loads, and to draw the related bending moment, shear force, and axial force diagrams. | 1, 2 | 1, 5, 10 | A |
| **5** | Ability to establish equilibrium equations for rigid bodies under the influence of friction forces and to calculate the unknowns in these equations. | 1, 2, 5 | 1, 5, 10 | A |
| **6** | Ability to analyze the relationship between force/moment and motion. | 1, 2, 3, 5 | 1, 5, 10 | A |
| **7** | Understanding the concepts of power, energy, linear and angular momentum, and their application in moving engineering systems. | 1, 2, 3, 5 | 1, 5, 10 | A |
| **8** |  |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | Engineering Mechanics Statics and Dynamics, R. C. Hibbeler, Pearson. |
| **Supporting References** | Teori ve Problemlerle Mühendislik Mekaniği Statik ve Dinamik, E. W. Nelson, C. L. Best, W. G. McLean, Ahmet Çelik, Nobel Yayıncılık. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to the Course and Fundamental Principles of Statics |
| **2** | Force Systems in Planes and in Space |
| **3** | Examination of Solid Bodies and Force Equilibrium Systems |
| **4** | Examination of Solid Bodies and Force Equilibrium Systems |
| **5** | Center of Gravity |
| **6** | Shear Force and Bending Moment Diagrams |
| **7** | Moment of Inertia |
| **8** | Mid-Term Exam |
| **9** | Truss Systems |
| **10** | Truss Systems |
| **11** | Definition and Analysis of Friction Forces |
| **12** | Definition and Analysis of Friction Forces |
| **13** | Fundamental Principles of Dynamics |
| **14** | Kinematics and Rotational Motion |
| **15** | Work, Energy and Power |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |  |  |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 12 | 12 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 12 | 12 |
|  | **Toplam iş yükü** | | **112** |
|  | **Toplam iş yükü / 30** | | **3,73** |
|  | **Dersin AKTS Kredisi** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| **Final Exam** | 60 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| --- | --- | --- | --- | --- |
| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Mesut TEKKALMAZ | Assist. Prof. Dr. Ersu LÖKÇÜ |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| THE HISTORY OF THE PRINCIPLES AND THE REVOLUTIONS OF ATATURK I |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| FALL | 2 | 0 | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  |  |  |  | X |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | None |
| **Objectives of the Course** | Students can understand the Liberation War under the leadership of Atatürk and the foundation of the young Turkish Republic. In addition to that the students will learn the processes of the liberation war and the conditions before the foundation of the Republic. |
| **Short Course Content** | The description of the revolution; the history of the Ottoman Empire up to the beginning of the Great War; Great War; The Treaty of Mudros; The Life of Mustafa Kemal Pasha; Civil Organizations for the liberation; Mustafa Kemal’s arrival to Samsun; Congresses; National Oath and the Opening of Turkish Grand National Assembly; Liberation War till the Battle of Sakarya; Büyük Taarruz. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | STUDENTS,  understand the main concepts of the course like reform, revolution |  | Expression | Class Attendance |
| **2** | learn the short history of the Ottoman Empire up to the Great War |  | Expression | Class Attendance |
| **3** | understand the join of the Ottoman Empire to the Great War and the fronts in which the Ottoman Empire fought |  | Expression | Class Attendance |
| **4** | learn the Treaty of Mudros and the invasion of the Ottoman lands |  | Expression | Class Attendance |
| **5** | understand the life of Mustafa Kemal Pasha (Atatürk) |  | Expression | Class Attendance |
| **6** | learn Mustafa Kemal’s arrival to Samsun and the beginning of the Liberation War |  | Expression | Class Attendance |
| **7** | understand the opening of Turkish Grand National Assembly and the foundation of national army |  | Expression | Class Attendance |
| **8** | learn the victories of İnonü, Sakarya and Büyük Taarruz |  | Expression | Class Attendance |

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| --- | --- |
| **Main Textbook** | Turan Şerafettin, *Türk Devrim Tarihi, C.I-II*, İstanbul, 1991–1995 |
| **Supporting References** | Ateş, Toktamış, *Türk Devrim Tarihi*, İstanbul: Der Yayınları, 2001.  Aybars, Ergün, *Türkiye Cumhuriyeti Tarihi*, İzmir: Ercan Kitabevi, 2000.  Eroğlu, Hamza, *Türk İnkılap Tarihi*, Ankara: Savaş Yayınları, 1990.  Kongar, Emre, *Devrim Tarihi ve Toplumbilim Açısından Atatürk*, İstanbul: Remzi Kitabevi, 1999.  Selek, Sebahattin, *Anadolu İhtilali,* İstanbul: Kastaç Yayınları, 1987.  Timur, Taner, *Türk Devrimi ve Sonrası*, Ankara: İmge Kitabevi, 1997. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | The teaching of the concepts of Revolution, Evolution, Uprising etc. |
| **2** | The attempts for the modernisation of the Ottoman Empire and the political thoughts |
| **3** | The Wars of Trablusgarp and the Balkans |
| **4** | The Beginning of the Great War and the join of the Ottoman Empire |
| **5** | The fronts in which the Ottoman Empire fought |
| **6** | The end of the war and the partition of the Ottoman |
| **7** | The Treaty of Mudros and the invasion of the Ottoman lands |
| **8** | Mid-Term Exam |
| **9** | The trip of Mustafa Kemal to Samsun and the beginning National Struggle |
| **10** | National Oath and the opening of Turkish Grand National Assembly |
| **11** | National Assembly and the direction of liberation war |
| **12** | National Forces and the foundation of the national army |
| **13** | First and Second Victories of İnönü; The battles of Kütahya-Eskişehir |
| **14** | The Battle of Sakarya |
| **15** | Great Attack of 30th August |
| **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) | 1 | 2 | 2 hours |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| 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 | 30 min | ½ hour |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 30 min | ½ hour |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **3 hours** |
|  | **Total workload / 30** | |  |
|  | **Course ECTS Credit** | | **2** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 60 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| --- | --- | --- | --- | --- |
| **LECTURER(S)** | | | | |
| **Prepared by** | Dr. Aynur ASGAROVA PINAR |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Techniques of Report Writing | 151913574 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| √ |  |  |  | √ |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | To provide students with the skills to write scientific reports and articles, prepare and present presentations, thus developing their skills in conducting scientific research. |
| **Short Course Content** | It includes information on scientific research methods, types of research and data collection methods, compiling sources, citing sources, preparing and presenting research reports orally, and writing reports and other correspondence that may be required in school, daily, business and academic life.. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | To ensure the development of students' ability to express themselves. | 1, 2, 4, 6, 7, 8, 9 | 1, 2, 5, 6, 15 | A, D, E, G |
| **2** |  |  |  |  |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | The Craft of Scientific Writing, Michael Alley, 3rd Edition, Springer Verlag, 1996 |
| **Supporting References** | Seyidoğlu, H., Bilimsel Araştırma ve Yazma El Kitabı, 8. Baskı, Güzem Yayınları, İstanbul, 2003.  Üstdal, M. Ve Gülbahar, K., Bilimsel Araştırma Nasıl Yapılır Nasıl Yazılır, Beta Basım A.Ş., İstanbul, 1997.  Karasar, N. “Araştırmada rapor hazırlamak”, 2003 |
| **Necessary Course Material** | Projection and computer |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction, Determining the Starting Point |
| **2** | Organizing the texts |
| **3** | Adjusting the Depth and Expression of Transitions, |
| **4** | Expressing the texts concisely |
| **5** | Expressing the texts clearly |
| **6** | Making the texts fluent |
| **7** | Using tables and graphs in the text |
| **8** | Mid-Term Exam |
| **9** | Optimizing the Design of the Writing |
| **10** | Writing Types of Petitions, Articles etc. |
| **11** | Preparation of Proposals and Suggestions |
| **12** | Improving the design of the writing for a successful writing |
| **13** | Improving the design of the writing for a successful writing |
| **14** | Practices related to writing writing |
| **15** | Practices related to writing writing |
| **16,17** | Final Exam (Presentations) |

|  |  |  |  |
| --- | --- | --- | --- |
| **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,….) |  |  |  |
| Homework | 2 | 24 | 48 |
| 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) | 1 | 26 | 26 |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam |  |  |  |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **116** |
|  | **Total workload / 30** | | **3.87** |
|  | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Homework | 50 |
|  |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam (Presentation)** | 50 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 3 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Hakan GAŞAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| BUSINESS ENGLISH | 151913559 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 2 | 0 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | 2 |  | 1 |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| English | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The program aims to provide students with the ability to learn and apply professional technical terms and sentence structures and to read and understand technical texts in English. In this way, students will be able to communicate internationally in the field of metallurgical and materials engineering and develop the English language skills necessary to be successful in their careers. |
| **Short Course Content** | Materials; metallic materials, ceramic materials, polymeric materials, composites. Properties of materials; mechanical properties, optical properties. Shaping processes; casting, molding, deformation and special techniques. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Students can understand and correctly use technical terms and expressions commonly used in the field of metallurgical and materials engineering. | 1,2,3 | 1,5,6 | A,B,K |
| **2** | Students can read and understand scientific and technical articles in English related to their field and extract important information from them. | 6,8 | 1,8,11 | A,B,K |
| **3** | Students can prepare written reports on technical reports, research papers and engineering projects in English and present these reports effectively. | 6,7,15 | 1,15,12 | A,B,K |
| **4** | Students can develop business English skills that they will use in their professional environment (e-mail writing, managing meetings, negotiating, etc.). | 7,12 | 1,6,12 | A,B,K |
| **5** | Students can present research results and engineering projects in English and discuss them effectively with colleagues. | 6,12,15 | 1,15,12 | A,B,K |
| **6** | Students can follow international literature including the latest developments and innovations in their field and use this information in their professional practice. | 8 | 1,11 | A,B,K |
| **7** | Students can prepare technical documents such as user manuals, technical specifications and product brochures in English. | 6,12 | 1,6 | A,B,K |
| **8** | Students can communicate effectively orally and in writing in English in professional environments and develop the communication skills necessary for projects and collaborations. | 7,12 | 1,6,12 | A,B,K |
| **9** | Students can attend international conferences and seminars, make presentations in English and participate in discussions. | 6,12,15 | 1,15,12 | A,B,K |
| **10** | Students can understand technical and scientific problems presented in English and propose solutions to these problems. | 1,2,10 | 1,10,11 | A,B,K |

|  |  |
| --- | --- |
| **Main Textbook** | 1. W.D. Callister, Materials Science and Engineering-An Introduction, 8th ed. John Wiley & Sons 2011 2. Malzeme konusunda süreli yayınlarda yayınlanmış makaleler. |
| **Supporting References** | English for Materials Science and Engineering, Exercises, Grammar, Case Studies, 1st ed., Iris Eisenbach, Vieweg+Teubner Verlag ,2011. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Course introduction |
| **2** | Technical English Concepts |
| **3** | Translation of intermediate level paragraphs selected from the material book |
| **4** | Translation of intermediate level paragraphs selected from the material book |
| **5** | Translation of intermediate level paragraphs selected from the material book |
| **6** | Translation of intermediate level paragraphs selected from the material book |
| **7** | Translation of intermediate level paragraphs selected from the material book |
| **8** | Ara Sınavlar |
| **9** | Translation of selected advanced paragraphs from the material book |
| **10** | Translation of selected advanced paragraphs from the material book |
| **11** | Review of short sections from published articles |
| **12** | Review of short sections from published articles |
| **13** | Review of short sections from published articles |
| **14** | Translation of selected advanced paragraphs from the material book |
| **15** | Translation of selected advanced paragraphs from the material book |
| **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 | 2 | 1 | 2 |
| 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) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1,5 | 1,5 |
| Studying for Mid-Term Exam | 1 | 10 | 10 |
| Final Exam | 1 | 1,5 | 1,5 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **113** |
|  | **Total workload / 30** | | **3,76** |
|  | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 10 |
| 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** | Having sufficient knowledge in engineering subjects related to mathematics, science and Metallurgical and Materials Engineering; ability to apply theoretical and applied knowledge in these fields and to model and solve engineering problems. | 2 |
| **2** | Ability to identify, define, formulate and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions by applying modern design methods. | 1 |
| **4** | Ability to develop, select and use modern techniques and tools required for engineering applications encountered as a Metallurgical and Materials Engineer; ability to use information technologies effectively. | 1 |
| **5** | Ability to design experiments, conduct experiments, collect data, analyze and interpret results to examine engineering problems. | 1 |
| **6** | Ability to work individually, within and between disciplines effectively. | 2 |
| **7** | Ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology and constantly renew oneself. | 2 |
| **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 effects of engineering practices on health, environment and safety in universal and societal dimensions and contemporary issues; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality awareness, quality control and sustainability in engineering practices, material selection, product development and production processes. | 1 |
| **13** | The ability to approach problems encountered in engineering practices with self-confidence. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. NEŞE ÖZTÜRK KÖRPE |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| TRANSPORT PHENOMENA | 151914563 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 4 | 3 | 0 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| **√** | **√** |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | Learning the basic mechanisms of fluid flow, understanding heat transfer mechanisms, understanding mass transfer and heterogeneous reactions in solids and fluids, learning the applications of transport phenomena in the field of Metallurgical and Materials Engineering. |
| **Short Course Content** | Fundamental concepts, fluid flow and viscosity, heat transfer, mass transfer, heterogeneous reactions. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learns stationary fluids and hydrostatic forces, classifies fluid types. | 1, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **2** | Learns the basic mechanisms of fluid flow, makes relevant calculations and defines the concept of viscosity. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **3** | Learns the concept of heat transfer, distinguishes different heat mechanisms. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **4** | Makes calculations for systems involving combined heat transfer with different heat transfer mechanisms. | 1, 2, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **5** | Gains knowledge about mass transport in solids, diffusion and atomic level transport in alloy systems. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **6** | Gains knowledge about mass transport in fluids. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **7** | Defines homogeneous and heterogeneous reactions, makes calculations regarding heterogeneous reactions. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **8** | Learns and defines the applications of transport phenomena in the field of Metallurgical and Materials Engineering. | 1, 2, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |

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| **Main Textbook** | Akışkanlar Mekaniği: Temelleri ve Uygulamaları, Yunus A. Çengel; Isı ve Kütle Transferleri: Pratik Bir Yaklaşım, Yunus A. Çengel |
| **Supporting References** | Taşınım Olayları (Ortak Yaklaşım) 1. Cilt, Robert S. Brodkey, Harry C. Hershey |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Fundamental concepts |
| **2** | Stationary fluids and hydrostatic forces |
| **3** | Flow types, continuity equation in fluids, Bernoulli's principle |
| **4** | Piezometer and pitot tubes |
| **5** | Velocity distribution in laminar flow, determination of flow type, Reynold’s number |
| **6** | Flow between parallel plates, drag force |
| **7** | Viscosity, Newton's law of viscosity, variation of viscosity with pressure and temperature. |
| **8** | Mid-Term Exam |
| **9** | Heat transfer by conduction |
| **10** | Heat transfer by convection |
| **11** | Heat transfer by radiation |
| **12** | Mass transfer in solids |
| **13** | Mass transfer in fluids |
| **14** | Heterogeneous reactions |
| **15** | Overview and problem solving |
| **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 | 1 | 2 |
| Studying for Quiz Exam | 2 | 6 | 12 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 14 | 14 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4,53** |
|  | **Course ECTS Credit** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 5 |
| Quiz | 5 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist. Prof. Dr. S. Mine Toker |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| ENGINEERING MATHEMATICS | 151914202 |

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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** |
| √ | √ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | To establish the mathematical basis to develop skills for core mechanical engineering courses, to incorprate the use of relevant software in engineering calculations |
| **Short Course Content** | Complex Analysis, Laplace Transformation, Solution of differential equations and coupled dif equations with Laplace transform and series solutions of differential equations, matrices, eigenvalues and eigenvectors, Fourier series, solution of matrice equations |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learn operations of complex numbers. | 1,4 | 1,2,5 | A,E,F,G |
| **2** | Know to Laplace and Inverse-Laplace operations. | 1,4 | 1,2,5 | A,E,F,G |
| **3** | Solve constant cooefficent differential equations using Laplace transformation | 1,4 | 1,2,5 | A,E,F,G |
| **4** | Solve partial differential equations with Laplace Transformation | 1,4 | 1,2,5 | A,E,F,G |
| **5** | Solve variable coefficient linear differential equations using Series method | 1,4 | 1,2,5 | A,E,F,G |
| **6** | Find the matrice of eigenvalues and eigenvectors | 1,4 | 1,2,5 | A,E,F,G |
| **7** | Find the fuction of the fourier series | 1,4 | 1,2,5 | A,E,F,G |
| **8** | Solve differantial equation with matrice method | 1,4 | 1,2,5 | A,E,F,G |

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| --- | --- |
| **Main Textbook** | Richard Bronson**,**  Schaum’s Outlines Differential Equations. McGraw Hill-Nobel |
| **Supporting References** | Özer N. Ve Eser D., Diferansiyel Denklemler, Eskişehir, 2002 Mathematical Handbook of Formulas and Tables, Murray R. Spiegel |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Complex numbers, complex algebra and complex plane. Polar form, roots of complex numbers, functions with complex variables |
| **2** | Cauchy Integral Theorem, singular points of an analytical function, poles, Residue theorem and residue calculations, closed-path integrals in complex plane |
| **3** | Laplace transformation, definition, Laplace transform of basic functions, basic transformation rules and theorems |
| **4** | Inverse Laplace transformation,inverse transformation tables and inversion techniques using closed-path integration and with the use of partial fractions |
| **5** | Solution of initial value problems using Laplace transformation, constant coefficient linear differential equations, and constant coefficient coupled differential equations |
| **6** | Solution of variable coefficient linear differential equations, and coupled differential equations  using Laplace transformation |
| **7** | Solution of partial differential equations with Laplace Transformation. Series solution of linear second order differential equation with no singular point at x=a |
| **8** | Mid-Term Examination |
| **9** | Series solution of linear second order differential equation with singular point at x=a |
| **10** | Series solution of linear second order differential equation with singular point at x=a |
| **11** | Bessel differantial equations and solutions, Bessel functions of the first and second king and its properties |
| **12** | Fourier series |
| **13** | Linear system of equations, Inverse of a Matrice, eigenvalues and eigenvectors, Cayley-Hamilton Theoremi and its applications |
| **14** | Solution of differantial equations using Matrice method |
| **15** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |
| Report Preparation |  |  |  |
| Report Presentation |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Report (Preparation and presentation time included) |  |  |  |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
| Crtics of publications |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  |  |  |  |
|  | **Total workload** | **140** |  |
|  | **Total workload / 30** | **4,666** |  |
|  | **Course ECTS Credit** | | **5** |
|  |  | |  |
|  |  | |  |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
|  |  |
|  |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. Şahin Coşkun |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| MATERIALS II | 151914556 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 4 | 3 | 0 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| **√** | **√** |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** | Materials I |
| **Objectives of the Course** | Understanding the details of fundamental materials science concepts; learning concepts such as diffusion, phase diagrams, phase transformations, microstructure at a basic level, recognizing material properties other than mechanical properties, establishing structure- property-process performance relationships in different types of material. |
| **Short Course Content** | Diffusion, phase diagrams, phase transformations and microstructures in Iron-Carbon systems, types and processing of metal alloys, structure and properties of ceramics and polymers, their applications and production; composites, advanced materials; electrical, thermal and optical properties of materials, corrosion. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learns the concept of diffusion in materials science and learns the processes in which diffusion is effective. | 1, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **2** | Learns phase diagrams at a basic level and understands the microstructure formation process in binary alloy systems. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **3** | Understands Iron-Carbon phase diagrams and the effect of carbon ratio on the microstructure of steel. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **4** | Explains the effect of heat treatment on the microstructure in Iron-Carbon systems and learns the effect of different microstructures on mechanical properties of steel. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **5** | Gains knowledge about the types and processing of metal alloys. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **6** | Gains knowledge about the structure, properties, applications and processing of ceramics. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **7** | Gains knowledge about the structure, properties, applications and processing of polymers. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **8** | Gains knowledge about composites and advanced materials. | 1, 4, 6, 8 | 1, 2, 5, 11 | A, B, K |
| **9** | Gain knowledge about the electrical, thermal and optical properties of materials and the concept of corrosion in metals. | 1, 4, 6, 8, 11 | 1, 2, 5, 11 | A, B, K |
| **10** | Recognizes the importance of material selection in engineering applications. | 1, 4, 6, 8, 13 | 1, 2, 5, 11 | A, B, K |

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| **Main Textbook** | William D. Callister, David G. Rethwisch, Malzeme Bilimi ve Mühendisliği (Materials Science and Engineering), 8. basımdan çeviri. |
| **Supporting References** | * H. Uzun, Mühendisler için Malzeme Biliminin Temel İlkeleri, 1. basım. * James F. Shackelford, Mühendisler için Malzeme Bilimine Giriş, 8. basımdan çeviri. * Ashby, M., Shercliff, H., Cebon, D., Materials: engineering, science, processing, and design, 2. veya 3. basım. |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Explaining the purpose and content of the course: Reviewing Materials I knowledge |
| **2** | Diffusion |
| **3** | Phase diagrams: Binary isomorphic systems |
| **4** | Phase diagrams: Binary eutectic systems |
| **5** | Phase diagrams: Iron-Carbon systems |
| **6** | Phase transformations in Iron-Carbon systems |
| **7** | Microstructures in Iron-Carbon systems |
| **8** | Mid-Term Exam |
| **9** | Types and processing of metal alloys |
| **10** | Structure and properties of ceramics; their applications and production |
| **11** | Structure and properties of polymers; their applications and production |
| **12** | Composites, advanced materials |
| **13** | Electrical, thermal and optical properties of materials |
| **14** | Corrosion |
| **15** | Overview |
| **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 | 1 | 2 |
| Studying for Quiz Exam | 2 | 6 | 12 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 14 | 14 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **136** |
| **Total workload / 30** | | **4,53** |
| **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 5 |
| Quiz | 5 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist. Prof. Dr. S. Mine Toker |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Metallurgical Thermodynamics II | 151914206 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | ✓ |  |  |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | 151913205 Metallurgical Thermodynamics I |
| **Objectives of the Course** | Solution thermodynamics; partial molar properties, ideal solutions, regular solutions, real solutions, phase diagrams and thermodynamic principles, activity; reference and standard selection |
| **Short Course Content** | Understanding the applications of thermodynamic laws in solutions, comprehending the fundamental thermodynamic principles in metallurgical processes |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understanding solution thermodynamics | 1, 2 | 1 | A, B |
| **2** | Applications of solution thermodynamics in metallurgical processes | 1, 2 | 1 | A, B |
| **3** | The concept of activity and its applications in metallurgical processes | 1, 2 | 1 | A, B |
| **4** | Understanding the relationships between phase diagrams, free energy, and activity | 3, 4 | 1 | A, B |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
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| **Main Textbook** | David Gaskell & David E. Laughlin, Introduction to the Thermodynamics of Materials, CRC Press, 2017 |
| **Supporting References** | Süheyla Aydın, Metalurji ve Malzeme Mühendisleri İçin Termodinamik, Literatür,2014 |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Basic Concepts and Definitions of Solution Thermodynamics |
| **2** | Thermodynamic Properties of Solutions |
| **3** | Ideal Solutions |
| **4** | Gibbs – Duhem Equation and Partial Properties |
| **5** | Gibbs – Duhem Equation and Partial Properties |
| **6** | Non-Ideal Solutions and Excess Properties |
| **7** | Non-Ideal Solutions and Excess Properties |
| **8** | Mid-Term Exam |
| **9** | Statistical Interpretation of Entropy |
| **10** | Statistical Interpretation of Enthalpy |
| **11** | Free Energy Composition Diagrams |
| **12** | Free Energy Activity Diagrams |
| **13** | Phase Diagrams |
| **14** | Phase Diagrams |
| **15** | Computational Thermodynamics 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 | 1 | 14 |
| Homework | 1 | 10 | 10 |
| Quiz Exam | 2 | 1 | 2 |
| Studying for Quiz Exam | 2 | 10 | 20 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 25 | 25 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **142** |
|  | **Total workload / 30** | | **4,73** |
|  | **Course ECTS Credit** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 5 |
| Quiz | 5 |
| Homework | 5 |
|  |  |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr.  Ersu LÖKÇÜ | Dr.  Reşat Can ÖZDEN |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGY AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| THE HISTORY OF THE PRINCIPLES AND THE REVOLUTIONS OF ATATURK II | 151914209 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| SPRING | 2 | 0 | 2 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | None |
| **Objectives of the Course** | The Students can understand; the victory at the Liberation War; The Treaty of Lausanne which paved the way for the foundation of the republic; The Principles and the Revolutions of Atatürk. Then the course will also provide the students to understand democracy and modern concepts |
| **Short Course Content** | The Armistice of Mudanya, The abolition of the dynasty, The Treaty of Lausanne, the foundation of the Republic, the abolution of Caliphate, the Constitution of 1924, the attempts for the multi-party system, the uprising of Şeyh Sait, the changing of alphabet, university reform, the revolutions of Atatürk towards all sides of life, interior and exterior politics of Atatürk, the principles of Atatürk, the developments in Turkey and world after the death of Atatürk |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Students,  learn the Armistice of Mudanya and the Treaty of Lausanne |  | Expression | Class Attendance |
| **2** | understand the abolition of dynasty and the Caliphate; foundation of the republic |  | Expression | Class Attendance |
| **3** | learn the attempts for multi-party system during Atatürk’s era |  | Expression | Class Attendance |
| **4** | see the revolutions on education and law which dedicate to create a secular and modern social structure |  | Expression | Class Attendance |
| **5** | learn the revolutions related with socio-economic life |  | Expression | Class Attendance |
| **6** | understand the foreign policy of Atatürk |  | Expression | Class Attendance |
| **7** | learn the principles of Atatürk |  | Expression | Class Attendance |
| **8** | understand the politics in Turkey after the death of Atatürk |  | Expression | Class Attendance |

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| **Main Textbook** | Turan Şerafettin, *Türk Devrim Tarihi, C.I-II*, İstanbul, 1991–1995 |
| **Supporting References** | Ateş, Toktamış, Türk Devrim Tarihi, İstanbul: Der Yayınları, 2001.  Aybars, Ergün, Türkiye Cumhuriyeti Tarihi, İzmir: Ercan Kitabevi, 2000.  Eroğlu, Hamza, Türk İnkılap Tarihi, Ankara: Savaş Yayınları, 1990.  Kongar, Emre, Devrim Tarihi ve Toplumbilim Açısından Atatürk, İstanbul: Remzi Kitabevi, 1999.  Selek, Sebahattin, Anadolu İhtilali, İstanbul: Kastaç Yayınları, 1987.  Timur, Taner, Türk Devrimi ve Sonrası, Ankara: İmge Kitabevi, 1997. |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | The Armistice of Mudanya; the abolition of dynasty and the Peace Treaty of Lausanne |
| **2** | The Foundation of the Republic and the abolition of the Caliphate |
| **3** | The Attempts for multi-party system; Assassination of İzmir and the movement in Menemen |
| **4** | The Revolutions on Law System: The constitutions of New Turkish State |
| **5** | The Revolutions on Law System: The acceptence of Civil Code and the regulations fort he woman rights |
| **6** | The Revolutions on Education and Cultural Life: The unity of education, the acceptance of new letters, the reforms on language, history and the other fields |
| **7** | The Revolutions for Economic Life: The abolition of aşar, reforms on agriculture and industry, etatism |
| **8** | Mid-Term Exam |
| **9** | The Changes on Social Life: the closing of tekkes and zawiyahs, the law of having surname, weekend holiday |
| **10** | The Foreign Policy of Atatürk: The problems of Etabli and Mosul, relations with foreign states |
| **11** | The Foreign Policy of Atatürk: membership to the United Nations, the Balkan Agreement, Montreux Convention, The Pact of Sadabad |
| **12** | The Principles of Atatürk: Republicanism, Secularism, Revolutionism, Nationalism, Populism, Etatism |
| **13** | The Supplementary Principles of Atatürk |
| **14** | The Interior and exterior developments during the period of İsmet İnönü |
| **15** | The Period of Democratic Party |
| **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) | 1 | 2 | 2 hours |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| 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 | 30 min. | ½ hour |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 30 min. | ½ hour |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **3 hours** |
|  | **Total workload / 30** | |  |
|  | **Course ECTS Credit** | | **2** |
| **Evaluation** | | | |
| **Activity Type** | **%** | | |
| Mid-term | 40 | | |
| Quiz |  | | |
| Homework |  | | |
| Bir öğe seçin. |  | | |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTURER(S)** | | | | |
| **Prepared by** | Dr. Aynur ASGAROVA PINAR |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Extractive Metallurgy | 151914558 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 4 | 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 | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | At the end of this course, the student will be able to;  1. define minerals, ore, rocks etc. 2. describe metal extraction from ore/raw materials ,  3. gain the experience of using the knowledge of the fundamentals of chemical thermodynamics to develop an understanding of the unit processes of extractive metallurgy. |
| **Short Course Content** | Ores and minerals, mineral processing, pretreatment processes, extraction processes, mass and heat balances. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Ability to define metal production processes, select appropriate analysis methods and solve them by applying them. | 1 | 1 | A,B |
| **2** | Ability to develop, select and use techniques and tools required for production processes. | 1,12 | 1 | A,B |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | 1.T. Rosenqvist, principles of Extractive Metallurgy, McGraw- Hill, 1982  2.C. K. Gupta, "Chemical Metallurgy," Wiley-VCH Verlag, 2003. |
| **Supporting References** | 1. F. Y. Bor, Ekstraktif Metalurji prensipleri, Kısım I-II, İTÜ yayınları, 1982 |
| **Necessary Course Material** | Computer, projection |

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| **Course Schedule** | |
| **1** | Introduction and Basic Concepts |
| **2** | Properties of ores and minerals |
| **3** | Ore preparation: Crushing, grinding, screening |
| **4** | Gravitation, flotation, mechanical separation, electrostatic separation |
| **5** | Drying, calcination, roasting |
| **6** | Agglomeration (briquetting, sintering, pelletizing) |
| **7** | Pyrometallurgy: Melting |
| **8** | Mid-Term Exam |
| **9** | Pyrometallurgy: Matte melting |
| **10** | Pyrometallurgy: Purification |
| **11** | Pyrometallurgy: Reduction of oxides |
| **12** | Mass and heat balance |
| **13** | Hydrometallurgy: Leaching |
| **14** | Hydrometallurgy: Precipitation, purification |
| **15** | Electrometallurgy: Electrowinning, Electrorefining |
| **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 |
| Quiz Exam | 2 | 1 | 2 |
| Studying for Quiz Exam | 2 | 6 | 12 |
| Oral exam |  |  | 0 |
| Studying for Oral Exam |  |  | 0 |
| Report (Preparation and presentation time included) |  |  | 0 |
| Project (Preparation and presentation time included) |  |  | 0 |
| Presentation (Preparation time included) |  |  | 0 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 14 | 14 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.533333** |
|  | **Course ECTS Credit** | | **5** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 10 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 3 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Dr. | Belgin TANIŞAN |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Ferrous Extractive Metallurgy | 151915301 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | **** |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** | 151914206 Metallurgical Thermodynamics II |
| **Objectives of the Course** | To understand pig iron production processes, to understand steel production processes, to understand the thermodynamic principles of iron and steel production processes. |
| **Short Course Content** | Fe-C-O System, Blast Furnace Properties, Fixed Bed Reduction, Moving Bed Reduction, Blast Furnace Chemistry, Hearth Reactions, Oxidation Reactions, Dissolved Gases, Deoxidation |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Describe pig iron production processes | 1, 2 | 1 | A |
| **2** | Describe steel production processes | 1, 2 | 1 | A |
| **3** | Relating processes to solution thermodynamics | 3, 4 | 2 | B |
| **4** | Relating metallurgical kinetics to production processes | 3, 4 | 2 | B |
| **5** | |  |  |  |
| **6** | |  |  |  |
| **7** | |  |  |  |
| **8** | |  |  |  |

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| --- | --- |
| **Main Textbook** | Physical Chemistry of Iron and Steel Manufacture  C. Bodsworth and Henry Bradley Bell, 1972 |
| **Supporting References** | An Introduction to the Physical Chemistry of Iron and Steel Making.  R. G. Ward. Arnold, St. Martin's Press, New York, 1962 |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Fe – O System |
| **2** | Fe – O – C System |
| **3** | Principles of Blast Furnace |
| **4** | Reduction in Fixed Bed |
| **5** | Reduction Moving Bed |
| **6** | Blast Furnace Chemistry |
| **7** | Hearth Reactions |
| **8** | Mid-Term Exam |
| **9** | Steelmaking Furnaces |
| **10** | Oxidation Reactions |
| **11** | Steelmaking Kinetics |
| **12** | Dissolved Gasses |
| **13** | De-oxidation Reactions |
| **14** | Alloy Steelmaking |
| **15** | Problems - Solutions |
| **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,….) |  |  |  |
| Homework |  |  |  |
| Quiz Exam | 2 | 2 | 4 |
| Studying for Quiz Exam | 2 | 8 | 16 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 17 | 17 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **108** |
| **Total workload / 30** | | **3.6** |
| **Course ECTS Credit** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 20 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at  least one foreign language | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself | 2 |
| **9** | Awareness of professional and ethical responsibility | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Mustafa ANIK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Ceramic Materials | 151915309 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | It aims to gain knowledge of structure and properties of ceramic materials, knowledge of designing, production procedure and methods |
| **Short Course Content** | Definition and classification of ceramic materials, Structure and properties of ceramic materials, chemistry of crystal structures: chemical bonding, crystal structures, phase diagrams, physical and thermal properties, mechanical, electric, magnetic and high temperature properties, production procedures and techniques, Sintering,Glass and refractories, design and application of ceramic materials |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Analyzing of engineering problems with the knowledge of ceramic material science | 1, 2, 4, 13 | 1, 2, 5 | A, D, K |
| **2** | Explanation of designing and production procedure of ceramics | 1, 2, 5, 8 | 1, 2, 5, 7, 13 | A, D, K |
| **3** | Comprehension of compositional designing of ceramics, determining of technical applications | 1, 4, 5, 8, 12 | 1, 2, 4, 11, 12 | A, D, K |
| **4** | Creation of new opportunities in ceramic industry | 1, 2, 4, 5, 12 | 1, 2, 5 | A, D, K |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Richerson, D. W. (1992). Modern Ceramic Engineering, ABD, Marcel Dekker Inc. |
| **Supporting References** | Bergeron C.G. & Risbud S. H. (1984).Introduction to Phase Equilibria in Ceramics*,* ABD, The American Ceramic Society, Inc. |
| **Necessary Course Material** | Computer |

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| --- | --- |
| **Course Schedule** | |
| **1** | Definition and classification, structure and properties of ceramic materials |
| **2** | Chemistry of crystal structures: chemical bonding, crystal structures |
| **3** | Phase diagrams |
| **4** | Mechanical properties |
| **5** | Physical and thermal properties |
| **6** | Electrical, magnetic and optical properties |
| **7** | Production procedures |
| **8** | Mid-Term Exam |
| **9** | Production procedures |
| **10** | Production procedures |
| **11** | Sintering |
| **12** | Production techniques |
| **13** | Glass and Refractories |
| **14** | Technical applications of ceramic materials |
| **15** | Design of ceramic materials |
| **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 | 1 | 10 | 10 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 12 | 12 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **114** |
|  | **Total workload / 30** | | **3,8** |
|  | **Course ECTS Credit** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Quiz | 15 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Dr. Bilge YAMAN ISLAK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| PHASE DIAGRAMS | 151915342 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| 1 | 3 |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The course's main objective is to develop students' knowledge and skills in phase diagrams and phase analyses, which are critical in materials science. At the same time, to provide students with a comprehensive understanding of phase diagrams and phase analyses of materials, and to enable them to use this information effectively in material selection, processing and application processes. Students can effectively interpret phase diagrams and phase analyses of materials at the end of this course and make informed decisions in material selection and processing processes using this information. |
| **Short Course Content** | Single and multi-component systems and their single and multi-phase combinations, phase rule and equilibrium conditions, phase diagrams of alloys that melt at all rates in the solid state, alloys that do not melt at all and alloys that melt at certain rates, phase analyses and cooling curves, structure diagrams, systems containing eutectic, eutectoid and peritectic, phase diagrams of alloys that form compounds, phase analysis examples of various alloys, iron-carbon phase diagram and detailed phase analyses, phase diagrams of three-component systems. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Students can read, interpret and predict material behaviors using phase diagrams of single and multi-component systems. | 1,2,3,4 | 1,4,6 | A,B,K |
| **2** | Students can analyze phase equilibrium states of various material systems using the phase rule and equilibrium conditions. | 1,2 | 1,6,10 | A,B,K |
| **3** | Students can recognize phase diagrams of alloys that melt at all rates, do not melt at all and melt at certain rates in the solid state and plan material selection and processing processes according to these diagrams. | 2,4 | 1,6,8 | A,B,K |
| **4** | Students can determine microstructure transformations of materials and the effects of these transformations on mechanical properties by analyzing cooling curves and structure diagrams. | 2,4 | 1,6,8 | A,B,K |
| **5** | Students can explain phase diagrams of systems containing eutectic, eutectoid and peritectic and phase transformations of these systems. | 1,2 | 1,6 | A,B,K |
| **6** | Students can analyze phase diagrams of alloys forming compounds and predict problems that may be encountered in the production and usage processes of these alloys. | 2,4 | 1,6,10 | A,B,K |
| **7** | Students can analyze the iron-carbon phase diagram in detail and the effects of this diagram on various material applications. | 1,2 | 1,6 | A,B,K |
| **8** | Students can determine phase equilibrium states and material behaviors in these systems by analyzing phase diagrams of three-component systems. | 1,2 | 1,6,10 | A,B,K |
| **9** | Students can determine the microstructural properties of materials and the effects of these properties on mechanical performance by performing phase analysis of various alloys. | 2,4 | 1,6,10 | A,B,K |
| **10** | Students can use the phase diagrams and analysis methods they learn in real-life engineering problems and develop solutions. | 1,2,3 | 6,10,14 | A,B,K |

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| --- | --- |
| **Main Textbook** | 1. Calculated Phase Diagrams: A Comprehensive Guide, Saunders, N.: Miodownic, A.P., Elsevier Science.  2.Principles of Thermodynamics, Kaufmann, Myron S., Marcel Dekker Incorporated  3.Metals Handbook, Phase Diagrams, American Society for Metals.  4.Malzeme Bilimi Problemleri ve Çözümleri, Onaran, K., Bilim Teknik Yay. |
| **Supporting References** | 1.Malzeme Bilimine Giriş Çözümlü Problemler, Özenbaş, M., ODTÜ Yay.  2.Metalurjistlere Denge Diyagramları, Tulgar E., İTÜ Yay. |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Single and multi-component systems and their single and multi-phase combinations |
| **2** | Phase rule and equilibrium conditions |
| **3** | Phase diagrams of alloys that melt at all rates, do not melt at all and melt at certain rates in the solid state |
| **4** | Phase analysis and cooling curves |
| **5** | Structure diagrams |
| **6** | Systems containing eutectic, eutectoid and peritectic |
| **7** | Phase diagrams of alloys that form compounds |
| **8** | Mid-Term Exam |
| **9** | Phase diagrams of compound alloys |
| **10** | Phase analysis examples of various alloys |
| **11** | Phase analysis examples of various alloys |
| **12** | Iron-carbon phase diagram and detailed phase analyses |
| **13** | Iron-carbon phase diagram and detailed phase analyses |
| **14** | Phase diagrams of three-component systems |
| **15** | Phase diagrams of three-component 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 | 2 | 28 |
| Homework |  |  |  |
| Quiz Exam | 2 | 1 | 2 |
| 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) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1,5 | 1,5 |
| Studying for Mid-Term Exam | 1 | 10 | 10 |
| Final Exam | 1 | 1,5 | 1,5 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **113** |
|  | **Total workload / 30** | | **3,76** |
|  | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 5 |
| Homework | 5 |
| 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** | Having sufficient knowledge in engineering subjects related to mathematics, science and Metallurgical and Materials Engineering; ability to apply theoretical and applied knowledge in these fields and to model and solve engineering problems. | 4 |
| **2** | Ability to identify, define, formulate and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions by applying modern design methods. | 3 |
| **4** | Ability to develop, select and use modern techniques and tools required for engineering applications encountered as a Metallurgical and Materials Engineer; ability to use information technologies effectively. | 2 |
| **5** | Ability to design experiments, conduct experiments, collect data, analyze and interpret results to examine engineering problems. | 3 |
| **6** | Ability to work individually, within and between disciplines effectively. | 2 |
| **7** | Ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 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 effects of engineering practices on health, environment and safety in universal and societal dimensions and contemporary issues; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality awareness, quality control and sustainability in engineering practices, material selection, product development and production processes. | 2 |
| **13** | The ability to approach problems encountered in engineering practices with self-confidence. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. NEŞE ÖZTÜRK KÖRPE |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Principles of Casting | 151915331 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | ✓ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The aim of this course is to teach students the fundamental principles of casting. |
| **Short Course Content** | Patterns, casting sand and testing, mold preparation techniques, cores, gating system design, riser design, casting methods. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The student will gain detailed knowledge of the fundamental concepts of casting technologies. | 1, 2, 3 | 1 | A, B, D |
| **2** | The student will learn how production is carried out through casting. | 1, 2, 3 | 1 | A, B, D |
| **3** | The student will acquire knowledge about the principles of different casting methods. | 1, 2, 3 | 1 | A, B, D |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Principles of Metal Casting, Heine, R.W., Loper, C.R., Rosenthal, P.C., A.F.S., McGraw-Hill Book Co. |
| **Supporting References** | Döküm Teknolojisi, Çavuşoğlu, E., İTÜ Yayını.  Demir Dökümü, Ersümer, A., İTÜ Yayını |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction - Basic concepts - Foundry process flowchart |
| **2** | Pattern - Core |
| **3** | Casting sand tests |
| **4** | Casting sand tests |
| **5** | Molding processes |
| **6** | Molding processes |
| **7** | Molding processes |
| **8** | Mid-Term Exam |
| **9** | Gating System Design |
| **10** | Riser design - Chills |
| **11** | Flaskless molding - Shell mold method |
| **12** | Plaster mold casting - Ceramic mold casting |
| **13** | Die Casting - Centrifugal Casting |
| **14** | Investment Casting |
| **15** | Continuous Casting |
| **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 | 1 | 14 |
| Homework |  |  |  |
| Quiz Exam | 1 | 1 | 1 |
| Studying for Quiz Exam | 1 | 10 | 10 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 20 | 20 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **115** |
|  | **Total workload / 30** | | **3,83** |
|  | **Course ECTS Credit** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 5 |
| Homework | 5 |
|  |  |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr.  Hakan GAŞAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| MECHANICAL PROPERTIES OF MATERIALS | 151915335 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 2 | 2 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| 1 | 3 | 1 |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The main aim of the course is to introduce mechanical properties of engineering materials. |
| **Short Course Content** | The tension test, the compression test, hardness test, the friction and wear test, the torsion test, the bending and fold test, creep and stress rupture, fracture and impact testing, fatigue of engineering materials. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Know the structure and mechanical behavior of materials. | 2,4,5 | 1,2,3,5 | A,B,D |
| **2** | Define, analyze and solve the problems. | 2,4,5 | 1,2,3,5 | A,B,D |
| **3** | |  |  |  |
| **4** | |  |  |  |
| **5** | |  |  |  |
| **6** | |  |  |  |
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| **Main Textbook** | Kayalı, E.S., Dikeç, F., (1996) Metalik Malzemelerin Mekanik Deneyleri, İstanbul, İTÜ. |
| **Supporting References** | 1. Metals Handbook (1985) Vol. 8, Mechanical Testing, ASM 2. Onaran, K., (1993), Malzeme Bilimi Problemleri ve Çözümleri, Bilim Teknik Kitap Evi, İnternet Veri Tabanları |
| **Necessary Course Material** | Computer and projector |

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| **Course Schedule** | |
| **1** | The tension test of metallic materials |
| **2** | The tension test of metallic materials |
| **3** | The compression test of metallic materials |
| **4** | The hardness test and applications |
| **5** | The hardness test and applications |
| **6** | The friction and wear tests |
| **7** | The torsion test |
| **8** | Mid-Term Examination |
| **9** | The bending and fold tests |
| **10** | The bending and fold tests |
| **11** | Creep and stress rupture |
| **12** | Brittle fracture and fracture toughness |
| **13** | Impact testing |
| **14** | Fatigue of metals |
| **15** | 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 | 4 | 56 |
| Classroom Studying Time (review, reinforcing, prestudy) | 14 | 3 | 42 |
| Homework | 1 | 8 | 8 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 12 | 12 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 14 | 14 |
|  |  |  |  |
|  |  |  |
| **Total workload** | | **136** |
| **Total workload / 30** | | **4,5333** |
| **Course ECTS Credit** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Homework | 15 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. Şahin Coşkun | Res.Assist.Dr. Kerem Aybar |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| MATERIALS CHARACTERIZATION I |  |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 2 | 2 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The aim of the course is to provide students with knowledge and skills in the examination and characterization of material microstructures, enabling them to establish a relationship between the microstructure and properties of materials. |
| **Short Course Content** | The principles and applications of various microscopy techniques such as optical microscopy, scanning electron microscopy (SEM), and transmission electron microscopy (TEM) are emphasized, and students learn how to determine the properties of materials through the analysis of their microstructures. The course provides students with practical experience in using microscopes and other characterization tools and equips them with the skills to analyze and interpret data obtained from microstructural analysis. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Imparting fundamental knowledge about the microstructures of materials and the effects of these structures on material properties. | 1, 3 | 1 | A |
| **2** | Teaching appropriate sample preparation methods for various microscopy techniques. | 2, 4 | 1, 3, 6, 8 | A, D |
| **3** | Providing practical experience in performing microstructural analysis of materials using microscopy techniques. | 1, 2, 4 | 1, 3, 6, 8 | A, D |
| **4** | Teaching how to analyze and interpret data obtained from microstructural analysis. | 1, 2 | 1, 3, 6, 8 | A, D |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Metallography: Principles and Practice, George F. Vander Voort, Electron Microscopy and Analysis, P. J. Goodhew, J. Humphreys, R. Beanland. |
| **Supporting References** | ASM Handbook Volume 9: Metallography and Microstructures  Metalografi, Prof, Dr. Emel Geçkinli, İTÜ yayınları. |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to Microscopy |
| **2** | Sample Preparation Techniques |
| **3** | Sample Preparation Techniques |
| **4** | Macrostructural Analysis |
| **5** | Microstructural Analysis |
| **6** | Microstructure-Property Relationships |
| **7** | Microstructure-Property Relationships |
| **8** | Mid-Term Exam |
| **9** | Scanning Electron Microscopy (SEM) |
| **10** | Transmission Electron Microscopy (TEM) |
| **11** | Chemical Analysis in Electron Microscopes |
| **12** | Chemical Analysis in Electron Microscopes |
| **13** | Metallographic Analysis Applications of Metallic Materials |
| **14** | Metallographic Analysis Applications of Metallic Materials |
| **15** | Image Processing and Analysis Methods |
| **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 | 1 | 10 | 10 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 12 | 10 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 12 | 10 |
|  | **Toplam iş yükü** | | **118** |
|  | **Toplam iş yükü / 30** | | **3,93** |
|  | **Dersin AKTS Kredisi** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Homework | 15 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr. Öğr Üyesi Şahin COŞKUN | Assist. Prof. Dr. Ersu LÖKÇÜ |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| PRODUCTION - MANUFACTURING PRACTISE | 151915XXX |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 5 | 0 | 0 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The aim is for students to transform the theoretical knowledge they have gained in the field of Metallurgy and Materials Engineering into practical applications, thereby familiarizing themselves with professional life and gaining experience. |
| **Short Course Content** | The production and shaping processes of all material groups, except for casting, and the characteristics of the equipment used in these processes are examined. The processes applied to improve the properties of the material are also addressed. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learning the implementation processes of various manufacturing methods, particularly fundamental techniques such as casting, forging, machining, and welding, and understanding the effects of these processes on material properties. | 4,5,6,12 | 11,12,15 | E |
| **2** | Recognizing the quality control methods and techniques used during production, and evaluating the impact of these techniques on material quality and production efficiency. | 4,5,6,12 | 11,12,15 | E |
| **3** | Understanding the importance of occupational health and safety regulations in manufacturing processes, and recognizing the necessity of considering environmental impacts and sustainability principles in production. | 4,5,6,12 | 11,12,15 | E |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | - |
| **Supporting References** | - |
| **Necessary Course Material** | - |

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| --- | --- |
| **Course Schedule** | |
| **1** | Evaluation of Internship Reports: |
| **2** | Evaluation of Internship Reports: |
| **3** | Evaluation of Internship Reports: |
| **4** | Evaluation of Internship Reports: |
| **5** | Evaluation of Internship Reports: |
| **6** | Evaluation of Internship Reports: |
| **7** | Evaluation of Internship Reports: |
| **8** | Mid-Term Exam |
| **9** | Evaluation of Internship Reports: |
| **10** | Evaluation of Internship Reports: |
| **11** | Evaluation of Internship Reports: |
| **12** | Evaluation of Internship Reports: |
| **13** | Evaluation of Internship Reports: |
| **14** | Evaluation of Internship Reports: |
| **15** | Evaluation of Internship Reports: |
| **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) | 1 | 60 | 60 |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| 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) | 1 | 15 | 15 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam |  |  |  |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **75** |
|  | **Total workload / 30** | | **2,5** |
|  | **Course ECTS Credit** | | **3** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term |  |
| Quiz |  |
| Homework |  |
|  |  |
| **Final Exam** |  |
| **BOARD** | 100 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 1 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 4 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 1 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr. Reşat Can ÖZDEN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Non-ferrous Metal Production | 151916325 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | 151914206 Metallurgical Thermodynamics II |
| **Objectives of the Course** | Teaching basic knowledge, method, process and technologies for production and refining of non-ferrous metals which are importent with respect to production and consumption. |
| **Short Course Content** | Aluminum, copper, zinc and non-ferrous metals, the history of the group, properties, alloys, raw materials, world production and consumption, production technologies, and environmental impacts. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learns the raw materials used in non-ferrous metal production, their properties and preparation techniques. | 1 | 1 | A |
| **2** | Learns the production technology of non-ferrous metals | 1, 4, 12 | 1 | A, B |
| **3** | Understands chemical reactions. | 1, 5 | 1 | A |
| **4** | Establishes a relationship between the production methods of non-ferrous metals. | 1, 4, 12, 14 | 1 | A |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
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| **Main Textbook** | Dennis,W.H., Demir Dışı Metaller Metalurjisi, İTÜ Yayını. |
| **Supporting References** | Okan,A., Açma,E., Arslan,C.,Çinko, Sistem Yayıncılık,1995.  Bor,F.Y., Ekstraktif Metalurji Prensipleri,Kısım I-II, İTÜ Yayını,1982. |
| **Necessary Course Material** | Computer, projection device |

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| **Course Schedule** | |
| **1** | Summary of metallurgical production methods. |
| **2** | Aluminum ores, alloys, consumption areas. |
| **3** | The production of alumina from the bauxite ore |
| **4** | Production of metallic aluminum by electrolysis. |
| **5** | Examples |
| **6** | Copper ores, alloys, and consumption areas. |
| **7** | The production of copper matte from sulphide containing copper ores. |
| **8** | Mid-Term Exam |
| **9** | Converter process of copper matte. |
| **10** | The production of metallic copper from the ores containing copper oxide and copper carbonate. Refining of copper: fire refining, electrolytic refining. |
| **11** | Refining of copper: fire refining, electrolytic refining. |
| **12** | Examples |
| **13** | Zinc ores, alloys, and consumption areas. |
| **14** | The production of metallic zinc from the sulphide containing zinc ores. |
| **15** | The production of metallic zinc from the ores containing zinc oxide and zinc carbonate. |
| **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 | 1 | 14 |
| Homework |  |  |  |
| Quiz Exam | 2 | 1 | 2 |
| Studying for Quiz Exam | 2 | 6 | 12 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 14 | 14 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 18 | 18 |
|  | **Total workload** | | **106** |
|  | **Total workload / 30** | | **3.53** |
|  | **Course ECTS Credit** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz | 10 |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 1 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Associate Professor  Belgin TANIŞAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Alloying Design | 151916345 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ | √ | √ |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Giving ability to understand the formation mechanisms of alloys and compounds, teaching how to use them when developing new materials. |
| **Short Course Content** | General description of alloys and compounds, substitutional and interstitial solid solutions, intermetallics, electron compounds and alloy types. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | What is alloy | 1, 3, 5, 11, 12 | 1, 5, 11 | A, B, K |
| **2** | Alloying principles | 1, 3, 5, 11, 12 | 1, 5, 11 | A, B, K |
| **3** | Alloy types and properties | 1, 3, 5, 11, 12 | 1, 5, 11 | A, B, K |
| **4** | Using of alloys | 1, 3, 5, 11, 12 | 1, 5, 11 | A, B, K |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Alaşımlar ders notları, İTÜ Kimya-Metalurji Fakültesi |
| **Supporting References** | Malzeme Kitapları, Metals Handbook 10. Baskı, 2. Cilt., Mesleki Kitaplar, Mesleki Dergiler |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Alloys and Compounds |
| **2** | Substitional Solid Solutions |
| **3** | Interstitial Solid Solutions and Compunds |
| **4** | Electron Compounds |
| **5** | Intermetallics |
| **6** | Laves Phases |
| **7** | Valans and Ionic Compounds |
| **8** | Mid-Term Exam |
| **9** | Aluminum and Its Alloys |
| **10** | Copper and Its Alloys |
| **11** | Titanium and Its Alloys |
| **12** | Magnesium and Its Alloys |
| **13** | Zinc Alloys, Nickel Alloys |
| **14** | Superalloys |
| **15** | Superalloys |
| **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 | 1 | 1 | 1 |
| Studying for Quiz Exam | 1 | 5 | 5 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 20 | 20 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **118** |
|  | **Total workload / 30** | | **3,93** |
|  | **Course ECTS Credit** | | **4** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz |  |
| Homework | 10 |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 3 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. İbrahim ÇELİKYÜREK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| MATERIALS CHARACTERIZATION II |  |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 6 | 2 | 2 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | ✓ |  |  |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The goal is to convey the working principles of characterization techniques used to determine the chemical and physical properties of materials and to provide the necessary knowledge and experience to select the appropriate characterization technique for material characterization. |
| **Short Course Content** | t involves conveying fundamental knowledge about characterization methods such as X-ray diffraction (XRD), X-ray fluorescence (XRF), thermal characterization methods (TGA/DTA/DSC), atomic force microscopy (AFM), and scanning tunneling microscopy (STM), as well as the analysis and interpretation of data obtained from these methods. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Analyze the structures, phases, and compositions of materials using X-ray techniques. | 1, 2 | 1, 2 | A, D |
| **2** | Acquire the ability to select appropriate tools for solving common problems in material characterization. | 1, 2 | 1, 2 | A |
| **3** | Gain the skill to relate and interpret the obtained characterization data with the fundamental principles of the techniques used. | 1, 2, 4 | 1, 2, 8 | A |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Materials Characterization , Introduction to Microscopic and Spectroscopic Methods., Y. Leng. John Wiley & Sons Pte Ltd., 2008. |
| **Supporting References** | Elements of X-Ray Diffraction, Cullity B.D. and Stock S.R., Prentice Hall, ABD, 2001.  Thermal analysis of Micro, Nano- and Non-Crystalline Materials, Jaroslav Šesták, Peter Šimon, Springer, 2013. |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Introduction |
| **2** | Properties and Production of X-rays |
| **3** | Crystal Structures, Crystal Systems, Miller Indices, and Crystal Planes |
| **4** | X-ray Diffraction (XRD) - Bragg's Law |
| **5** | X-ray Diffraction (XRD) - Crystal Structure Analysis |
| **6** | X-ray Diffraction (XRD) - Phase Analysis and Quantitative Analysis Methods |
| **7** | X-ray Diffraction (XRD) - Phase Analysis and Quantitative Analysis Methods |
| **8** | Mid-Term Exam |
| **9** | X-ray Fluorescence (XRF) |
| **10** | X-ray Fluorescence (XRF) |
| **11** | Thermal Characterization Methods |
| **12** | Thermal Characterization Methods |
| **13** | Atomic Force Microscopy (AFM), Scanning Tunneling Microscopy (STM) |
| **14** | Software and Tools Used in Data Analysis |
| **15** | Analysis and Reporting of Characterization Data |
| **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 | 1 | 10 | 10 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 12 | 10 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 12 | 10 |
|  | **Toplam iş yükü** | | **118** |
|  | **Toplam iş yükü / 30** | | **3,93** |
|  | **Dersin AKTS Kredisi** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Homework | 15 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr. Öğr Üyesi Şahin COŞKUN | Assist. Prof. Dr. Ersu LÖKÇÜ |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Casting Technologies | 151916335 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 6 | 2 | 2 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | 151915343- Principles of Casting |
| **Objectives of the Course** | The aim of this course is to teach students the principles of casting design, casting errors and their prevention methods. |
| **Short Course Content** | Solidification Technique, casting design principles, melting processes, cast irons, steel castings, non-ferrous castings, charge calculations, casting errors and their prevention. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The basic principles of casting design will be learned, | 1, 2, 3 | 1, 3 | A, B, D |
| **2** | Casting of different metals will be learned, | 1, 2, 3 | 1, 3 | A, B, D |
| **3** | Charge calculation can be made, | 1, 2, 3 | 1 | A, B, D |
| **4** | Will have competence in preventing casting errors, | 1, 2, 3, 9 | 1 | A, B, D |
| **5** | The principles of different melting techniques will be known. | 1, 2, 3 | 1 | A, B, D |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Principles of Metal Casting, Heine, R.W., Loper, C.R., Rosenthal, P.C., A.F.S., McGraw-Hill Book Co. |
| **Supporting References** | Döküm Teknolojisi, Çavuşoğlu, E., İTÜ Yayını.  Demir Dökümü, Ersümer, A., İTÜ Yayını |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Introduction-Grey Cast irons |
| **2** | White Cast Irons - Cast Irons with Nodular Graphite |
| **3** | Steel Casting |
| **4** | Charge Calculations |
| **5** | Casting Design Principles |
| **6** | Casting Design Principles |
| **7** | Casting Design Principles |
| **8** | Mid-Term Exam |
| **9** | Casting Design Principles |
| **10** | Casting Defects |
| **11** | Casting Defects |
| **12** | Casting Defects |
| **13** | Smelting Methods |
| **14** | Smelting Methods |
| **15** | Smelting Methods |
| **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 | 4 | 56 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 14 | 1 | 14 |
| Homework | 1 | 20 | 20 |
| Quiz Exam | 1 | 1 | 1 |
| Studying for Quiz Exam | 1 | 9 | 9 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **142** |
|  | **Total workload / 30** | | **4.73** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 5 |
| Homework | 5 |
|  |  |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr.  Hakan GAŞAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Polymer Materials | 151916328 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| ✓ | ✓ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | It is aimed to gain a basic understanding by generally focusing on the relationship between polymer structure, chain structures, chemical structure (chain arrangement) and solid morphology (semi-crystalline, amorphous polymers, etc.). |
| **Short Course Content** | After an introduction to polymer science and engineering and an overview of the synthesis and structure of polymers, basic issues such as their areas of use, crystalline and amorphous states, molecular weight, mechanical and rheological properties will be discussed. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Be able to identify and classify polymers | 1, 4, 8, 9, 12 | 1, 2, 8 | A, B, K |
| **2** | Have information about natural, synthetic and semi-synthetic polymers | 1, 3, 4, 8, 9, 11, 12 | 1, 2, 8 | A, B, K |
| **3** | Be able to define and classify synthesis methods of polymers | 1, 3, 4, 8, 9, 11, 12 | 1, 2, 8 | A, B, K |
| **4** | Be able to define copolymers and has information about their properties and production | 1, 3, 4, 8, 9, 11, 12 | 1, 2, 8 | A, B, K |
| **5** | Gain information about the structure, crystal and amorphous structure of polymers | 1, 3, 4, 8, 9, 11, 12 | 1, 2, 8 | A, B, K |
| **6** | Gain information about the thermal properties of polymers | 1, 3, 4, 8, 9, 11, 12 | 1, 2, 8 | A, B, K |
| **7** | Defines polymer solutions and has information about different solutions | 1, 3, 4, 8, 9, 11, 12 | 1, 2, 8 | A, B, K |
| **8** | Gain knowledge about the mechanical and rheological properties of polymers | 1, 3, 4, 8, 9, 11, 12 | 1, 2, 8 | A, B, K |

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| **Main Textbook** | Avci H. Polimerler: Özellikleri ve Uygulamaları, ESOGU Yayınevi. 2021. |
| **Supporting References** | 1. SAÇAK Mehmet, Polimer Kimyası, Fersa Matbaacılık, Ankara 2002  2. SAÇAK Mehmet, Polimer Teknolojisi, Baran Ofset, Ankara, 2005 |
| **Necessary Course Material** | Computer (connected to the internet) and projector |

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| **Course Schedule** | |
| **1** | Introduction to polymer science |
| **2** | Polymer synthesis methods |
| **3** | Polymer synthesis methods |
| **4** | Copolymerization |
| **5** | Copolymerization |
| **6** | Polymer structure: chain structures, amorphous polymer, morphology of semi-crystalline polymers |
| **7** | Polymer structure: chain structures, amorphous polymer, morphology of semi-crystalline polymers |
| **8** | Mid-Term Exam |
| **9** | Crystallization, melting and glass transition temperature |
| **10** | Structure and properties of polymer solutions |
| **11** | Structure and properties of natural and synthetic polymers |
| **12** | Mechanical properties of polymers |
| **13** | Rheological properties of polymers |
| **14** | Presentations |
| **15** | An overview |
| **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 | 1 | 1 | 1 |
| Studying for Quiz Exam | 1 | 3 | 3 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  | **Total workload** | | **110** |
|  | **Total workload / 30** | | **3,7** |
|  | **Course ECTS Credit** | | **4** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Quiz | 15 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 1 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Hüseyin Avcı |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Heat Treatments of Metals | 151916336 |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 6 | 2 | 2 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ | √ | √ |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Microstructural properties of materials have effected of mechanical properties of materials, to learn the relations of microstructures and mechanical properties. |
| **Short Course Content** | General information of steel materials and productions. Mechanical properties and application areas of metallic materials, general heat treatments and special heat treatments. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Defining steels and heat treatments | 1,2,5,6,7,8,11,12 | 1,2,3,4,7,15 | A,E,I,K |
| **2** | Making comments on materials properties | 1,2,5,6,7,8,11,12 | 1,2,3,4,7,15 | A,E,I,K |
| **3** | Learning the importance of heat treatment on applications | 1,2,5,6,7,8,11,12 | 1,2,3,4,7,15 | A,E,I,K |
| **4** | Making design for material selection | 1,2,5,6,7,8,11,12 | 1,2,3,4,7,15 | A,E,I,K |
| **5** | Evaluate the materials for working conditions. | 1,2,5,6,7,8,11,12 | 1,2,3,4,7,15 | A,E,I,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Çelik ve Isıl İşlemi, Bofors El Kitabı, Adnan Tekin. |
| **Supporting References** | **1.**ASM Handbook V.4, Heat Treatment  **2.** Malzeme Bilimi ve Mühendisliği, Smith, W.F., Çev.Kınıkoğlu, N.G., Literatür Yay.  **3.**Malzemelerin Yapı ve Özellikleri, I-II-III-IV, Moffat, W.G., Pearsall, G.W., Wulff, J., Çev. Onaran, K., Erman, B., İTÜ Yay. |
| **Necessary Course Material** | Computer and projection device. |

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| **Course Schedule** | |
| **1** | Steel materials and definitions. |
| **2** | Production of steels and standards. |
| **3** | General heat treatments and Fe-C Phase diagram. |
| **4** | TTT and CCT diagrams |
| **5** | Hardening, normalizing, and stress relieving heat treatments. |
| **6** | Re-crystallization and tempering heat treatment. |
| **7** | Martempering and austempering |
| **8** | Mid-Term Exam |
| **9** | Diffusion |
| **10** | Surface hardening treatments and cementation |
| **11** | Nitriding, boriding, surface modification by using PTA and TIG |
| **12** | Induction and flame hardening. |
| **13** | Failure analysis of heat treated components. |
| **14** | Presentation of students homeworks. |
| **15** | Presentation of students homeworks. |
| **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 | 4 | 56 |
| 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) | 3 | 10 | 30 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1 | 1 |
| Studying for Mid-Term Exam | 1 | 20 | 20 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **156** |
|  | **Total workload / 30** | | **5,2** |
|  | **Course ECTS Credit** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz |  |
| Homework |  |
| Report | 30 |
| Bir öğe seçin. |  |
| **Final Exam** | 40 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 4 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 3 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. İbrahim ÇELİKYÜREK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Plastic Forming |  |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| √ | √ | √ | √ |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Teaching the plastic deformation principles and formation technics of metallic materials. |
| **Short Course Content** | Plastic forming methods, stress-strain relations, , plastic deformation mechanisms, the factors affecting the plastic deformation, forging, rolling, extrusion, wire drawing, cutting, bending, deep drawing |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Main principles of plastic deformation of metals | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **2** | Relations between Stress-strain | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **3** | Plastic deformation machanisms | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **4** | Factors affecting the plastic deformation | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **5** | Forming methods | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Metallere plastik şekil verme ilke ve uygulamaları |
| **Supporting References** |  |
| **Necessary Course Material** | PC and projection |

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| --- | --- |
| **Course Schedule** | |
| **1** | Plastic forming methods |
| **2** | Stress-strain relations |
| **3** | Stress-strain relations |
| **4** | Plastic deformation mechanisms |
| **5** | Plastic deformation mechanisms |
| **6** | Factors affecting the plastic deformation |
| **7** | Factors affecting the plastic deformation |
| **8** | Mid-Term Exam |
| **9** | Forging |
| **10** | Rolling |
| **11** | Extrussion |
| **12** | Cutting, bending |
| **13** | Deep drawing |
| **14** | Drawing |
| **15** | Drawing |
| **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 | 1 | 14 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 20 | 20 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **98** |
|  | **Total workload / 30** | | **3,3** |
|  | **Course ECTS Credit** | | **3** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 5 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. İbrahim ÇELİKYÜREK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Design Methods in Recycling of Metallurgical Wastes |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| √ | √ |  |  |  |

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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 main objective of the course is to provide students with information on recycling processes of metallurgical wastes and the design methods used in these processes. In this course, students will examine the techniques and methods applied for minimizing, reusing and recycling metallurgical wastes. They will also gain knowledge on sustainability and reducing environmental impacts. |
| **Short Course Content** | Waste Characterization, Process Design, Recycling of Metals-Polymers-Glasses, Resource Recovery from Process Wastes, Recycling of Water and Reagents, New Technologies |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | To have knowledge about the definition, classification and management methods of metallurgical wastes. To be able to explain the basic concepts and principles of waste management. | 1 | 1,2,5,7 | A,D,E,G |
| **2** | To be able to define the physical, chemical and biological methods used in the recycling of metallurgical wastes. To be able to compare the advantages and disadvantages of these methods. | 1,2 | 1,2,5,7 | A,D,E,G |
| **3** | To be able to evaluate the environmental impacts of metallurgical wastes and apply sustainability principles. To be able to develop strategies to reduce the environmental footprint of recycling processes. | 11,12 | 10,12,14 | A,D,E,G |
| **4** | To be able to develop solutions using effective design methods in recycling processes. To be able to develop projects for the reuse and recycling of wastes by applying innovative design approaches. | 3,4 | 10,14,15 | A,D,E,G |
| **5** | To be able to make economic analyses related to the recycling of metallurgical wastes. To be informed about national and international legal regulations and standards and to be able to apply this information. | 10 | 1,2,5,10 | A,D,E,G |
| **6** | To be able to define the application areas of metallurgical waste recycling in different industries.  To be able to reinforce knowledge with real world examples and case studies. | 4,6 | 1,7 | A,D,E,G |
| **7** | To be able to define the problems encountered in the recycling of metallurgical wastes and to develop solution proposals for these problems. To be able to optimize recycling processes using analytical thinking skills. | 2 | 2,10,11,12 | A,D,E,G |
| **8** | Ability to work in teams and use effective communication skills in project-based learning activities.  Developing technical report writing and presentation skills. | 6,7 | 12,15 | A,D,E,G |

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| --- | --- |
| **Main Textbook** | S.R. Ramachandra Rao - Resource Recovery and Recycling from Metallurgical Wastes, Volume 7 (Waste Management)-Elsevier Science (2006) |
| **Supporting References** | Kuan-Yeow Show\_ Xinxin Guo - Industrial waste-InTech (2012)  Herbert Pöllmann - Industrial Waste\_ Characterization, Modification and Applications of Residues-De Gruyter STEM (2021)  Lawrence K. Wang, Nazih K. Shammas, Yung-Tse Hung - Advances in Hazardous Industrial Waste Treatment-CRC Press (2009) |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Waste Characterization |
| **2** | Process Design (Hydrometallurgy,) |
| **3** | Process Design (Pyrometallurgy, Biotechnology) |
| **4** | Recycling of Metals (Fe, Al, Cu, Pb, Zn, Ni, Co, Mg) |
| **5** | Recycling of Metals (Precious Metals, Rare Earth Elements, Refractory Metals) |
| **6** | Recycling of Polymers |
| **7** | Glass Recycling |
| **8** | Mid-Term Exam |
| **9** | Slag Processes |
| **10** | Fly Ash Processes |
| **11** | Ore Process Wastes |
| **12** | Resource Recovery from Process Wastes (Recovery of Metal Concentrates from Waste Sludges, Solid Wastes) |
| **13** | Resource Recovery from Process Wastes (Recovery from Discarded Batteries) (Metal Recovery from Used Petroleum Catalysts) |
| **14** | Recycling of Water and Reagents |
| **15** | New technologies |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |
| Quiz Exam |  |  | 0 |
| Studying for Quiz Exam |  |  | 0 |
| Oral exam |  |  | 0 |
| Studying for Oral Exam |  |  | 0 |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  | 0 |
| Presentation (Preparation time included) | 7 | 2 | 14 |
|  |  |  |  |
|  | 1 | 2 | 2 |
| Mid-Term Exam | 1 | 8 | 8 |
| Studying for Mid-Term Exam | 1 | 2 | 2 |
| Final Exam | 1 | 10 | 10 |
| Studying for Final Exam | 7 | 2 | 14 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.533333333** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. | 45 |
| **Final Exam** | 100 |
| **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** | Having sufficient knowledge in engineering subjects related to mathematics, science and Metallurgical and Materials Engineering; ability to apply theoretical and applied knowledge in these fields and to model and solve engineering problems. | 4 |
| **2** | Ability to identify, define, formulate and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions by applying modern design methods. | 4 |
| **4** | Ability to develop, select and use modern techniques and tools required for engineering applications encountered as a Metallurgical and Materials Engineer; ability to use information technologies effectively. | 2 |
| **5** | Ability to design experiments, conduct experiments, collect data, analyze and interpret results to examine engineering problems. | 1 |
| **6** | Ability to work individually, within and between disciplines effectively. | 2 |
| **7** | Ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology and constantly renew oneself. | 2 |
| **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 effects of engineering practices on health, environment and safety in universal and societal dimensions and contemporary issues; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality awareness, quality control and sustainability in engineering practices, material selection, product development and production processes. | 4 |
| **13** | The ability to approach problems encountered in engineering practices with self-confidence. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. Neşe ÖZTÜRK KÖRPE |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Design with Smart Materials |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ | √ |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The main objective of the course, is to introduce and design the methods to utilize smart materials to various environments. |
| **Short Course Content** | Description and objectives, general description and classification of smart materials, the relationship with smart materials and environmental factors (e.g. heat , electrical, magnetic field and mechanical movement effects) and working principles. The observation of how to utilize and design smart materials according to working environment. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | to classify smart materials | 1,2,4 | 1,4,5,8 | A,B,D,E,G,J,K |
| **2** | the observation on behavior of smart materials to changing environmental effects | 1,2,3,4,5 | 1,4,5,8 | A,B,D,E,G,J,K |
| **3** | implementation of How to design the smart structures to desired properties, | 2,3,4,5,12 | 1,4,5,8 | A,B,D,E,G,J,K |
| **4** | to gain the inter disciplinary relations by personal design projects | 2,3,4,5,6,10,11,12,13 | 1,4,5,8 | A,B,D,E,G,J,K |
| **5** | to gain ability to effectively work in team | 6,9,10,11,12,13 | 1,4,5,8 | A,B,D,E,G,J,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | A. V. Srinivasan, Michael McFarland, Smart Structures Analysis and Design, Cambridge University Press, 2001, |
| **Supporting References** |  |
| **Necessary Course Material** | Reading, comprehension and presentations |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Information about course scope, execution, evaluation |
| **2** | definition of smart materials, the importance of smart materials and classification |
| **3** | Piezo materials |
| **4** | Electro and magneto-strictive materials |
| **5** | Shape memory materials |
| **6** | Electro and magneto rheologic materials |
| **7** | Polymers and polymer gels |
| **8** | Mid-Term Exam |
| **9** | Self-healing materials |
| **10** | The principles of design with smart materials |
| **11** | Designing smart materials in electrical fields |
| **12** | Designing smart materials under heat effect |
| **13** | Designing smart materials in magnetic fields |
| **14** | Designing smart materials under mechanical forces |
| **15** | Designing smart materials under mechanical forces |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |
| Quiz Exam |  |  | 0 |
| Studying for Quiz Exam |  |  | 0 |
| Oral exam |  |  | 0 |
| Studying for Oral Exam |  |  | 0 |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  | 0 |
| Presentation (Preparation time included) | 1 | 4 | 4 |
|  | 7 | 2 | 14 |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Quiz | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 45 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Dr. Bedri BAKSAN |  |  |  |
| **Signature(s)** |  |  |  |  |

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**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Polymer Materials and Design | 151917631 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| ✓ | ✓ | ✓ |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | One of the main objectives of the course is to provide information about polymeric structures that are frequently used or have the potential to be used in today's and future technologies, their design and design criteria. |
| **Short Course Content** | Along with the basic concepts about polymers, their production and differences, various methods that have an important place in design, such as spinning technologies and electrospinning, which is today's popular nanofiber production technique, microfluidic production techniques, polymer-structured films and membranes, etc. topics will be covered. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Acquiring knowledge on issues related to the definition, classification and production of polymers | 1, 4, 8, 11, 12 | 1, 2, 5, 8 | A, E, K |
| **2** | Acquiring knowledge about the behavior of structural properties of polymers | 1, 4, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **3** | Learning the principles regarding the properties and use of materials related to spinning technologies and functional polymeric products. | 1, 2, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **4** | Learning the principles of nanofiber production techniques, the structure of these fibers and their application areas. | 1, 2, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **5** | Learning the principles of thermoplastic and thermoset polymer-based microfluid production, properties, design and applications. | 1, 2, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **6** | Acquiring knowledge on natural polymeric materials and polymer film and membrane production and application areas. | 1, 2, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |

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| --- | --- |
| **Main Textbook** | Su, W. F. (2013). *Principles of polymer design and synthesis*. Berlin, Heidelberg: Springer Berlin Heidelberg. |
| **Supporting References** | 1. Avci H. Polimerler: Özellikleri ve Uygulamaları, ESOGU Yayınevi. 2021.  2. SAÇAK Mehmet, Polimer Kimyası, Fersa Matbaacılık, Ankara 2002  3. SAÇAK Mehmet, Polimer Teknolojisi, Baran Ofset, Ankara, 2005  4. Andrady, A. L. (2008). Science and technology of polymer nanofibers. John Wiley & Sons |
| **Necessary Course Material** | Computer with internet and projector. |

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| --- | --- |
| **Course Schedule** | |
| **1** | Discussing basic concepts and definitions about polymers, classification of polymers, structure and naming of polymers. |
| **2** | Polymerization reactions; addition and condensation polymerization |
| **3** | Copolymerization |
| **4** | Effects of structural properties of polymers on their behavior |
| **5** | Overview of spinning technologies |
| **6** | Use of functional fibers obtained by spinning methods in high performance, protective and health fields |
| **7** | Nanofiber production techniques, structure and application areas of these fibers |
| **8** | Mid-Term Exam |
| **9** | Electrospinning process and its importance |
| **10** | Thermoplastic polymer-based microfluidic production, design and applications |
| **11** | Thermosetting polymer-based microfluidic production, design and applications |
| **12** | Structure, properties and usage areas of natural polymer fibers |
| **13** | Polymer film and membrane production and application areas |
| **14** | Presentations |
| **15** | An overview |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |
| Quiz Exam |  |  | 0 |
| Studying for Quiz Exam |  |  | 0 |
| Oral exam |  |  | 0 |
| Studying for Oral Exam |  |  | 0 |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  | 0 |
| Presentation (Preparation time included) | 1 | 4 | 4 |
| Article examination | 7 | 2 | 14 |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.533333333** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| **Final Exam** | 45 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 3 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 5 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Hüseyin Avcı |  |  |  |
| **Signature(s)** |  |  |  |  |

**Date:**06.06.2024

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| MECHANICAL METALLURGY |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 |  | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| 1 | 4 |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The main aim of the course is to introduce mechanical behavior of the materials with external forces. |
| **Short Course Content** | Stress and strain relationship, mechanics of strain, plastic deformation, active factors on the plastic deformation, strengthening mechanisms, thermo-mechanical processes, fracture |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Know the basic principles and technologies of mechanical metallurgy. | 1,4 | 1,2,5 | A,E,F,G |
| **2** | Analysis, design and evaluation of data | 1,4 | 1,2,5 | A,E,F,G |
| **3** | Define, analyze and solve the problems. | 1,4 | 1,2,5 | A,E,F,G |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Dieter, G.E., (1988) Mechanical Metallurgy, McGraw-Hill Book Company |
| **Supporting References** | 1. Kayalı, E.S. ve Ensari, C. (1986) Metallere Plastik Şekil Verme İlke ve Uygulamaları, İstanbul, İTÜ. Internet databases |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Stress and strain relationships |
| **2** | Stress and strain relationships |
| **3** | Mechanics of elastic strain |
| **4** | Mechanics of plastic strain |
| **5** | Mechanics of plastic strain |
| **6** | Plastic deformation |
| **7** | Active factors on the plastic deformation |
| **8** | Mid-Term Examination |
| **9** | Mid-Term Examination |
| **10** | Active factors on the plastic deformation |
| **11** | Strengthening mechanisms |
| **12** | Strengthening mechanisms |
| **13** | Thermo-mechanical processes |
| **14** | Fracture |
| **15** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |
| Report Preparation | 8 | 3 | 24 |
| Report Presentation | 2 | 4 | 8 |
| 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) |  |  |  |
| Crtics of publications | 8 | 2 | 16 |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  |  |  |  |
|  | **Total workload** | | **140** |
|  | **Total workload / 30** | | **4,666** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 45 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. Şahin Coşkun |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Powder Metallurgy |  |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ | √ | √ |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Basic aim of this course is providing the perfectiveness of powder metallurgy treatments by respecting the basic principles of powder metallurgy. |
| **Short Course Content** | Introduction to powder metallurgy, Production of metals powder, characterization of powder, Pressing, sintering |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understanding the powder metallurgy | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **2** | Production methods of metal powder | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **3** | Characterization of powder | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **4** | Pressing | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **5** | Sintering | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Powder Metallurgy Technology, G S Upadhyaya  Metals Handbook ASM volume 7, ‘Powder Metallurgy’1994. |
| **Supporting References** | Ersümer, A., ‘ Toz Metalurjisinin Esasları’, İTÜ 1970, İstanbul.  Randal, M., ‘ Toz metalurjisi ve parçacıklı malzemeler’ Çevirenler: Sarıtaş, S., Türker, M., Ankara. |
| **Necessary Course Material** | PC and projection |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction, history, reasons of using metallic powders |
| **2** | Characterizations of powders, particle shape, particle size (surface area), compressibility, inner structure of powders |
| **3** | Methods of powder production; mechanical production methods |
| **4** | Electrolyze Method for powder production, chemical methods for powder production |
| **5** | Atomization method for powder production, vaporization method |
| **6** | Nano sized powder production, micro structure controlling of powders |
| **7** | Forming of powders, binders and terms of shaping |
| **8** | Mid-Term Exam |
| **9** | Pressing of powders, pressing with mould |
| **10** | Cold izostatic pressing, press design |
| **11** | Sintering, theory of solid state sintering, pore structure developing |
| **12** | Densification mechanism, effects of predensity on sintering |
| **13** | Densification mechanism, effects of predensity on sintering |
| **14** | Liquid phase sintering, desing of sintering oven, proving densification |
| **15** | Liquid phase sintering, desing of sintering oven, proving densification |
| **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 | 1 | 1 | 1 |
| Studying for Quiz Exam | 1 | 10 | 10 |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 20 | 20 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1 | 1 |
| Studying for Mid-Term Exam | 1 | 20 | 20 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Toplam iş yükü** | | **143** |
|  | **Toplam iş yükü / 30** | | **4,77** |
|  | **Dersin AKTS Kredisi** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 10 |
| Homework |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. İbrahim ÇELİKYÜREK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Nanotechnology |  |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | ✓ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The goal of the nanotechnology course is to teach students the fundamental principles, materials, and applications of nanotechnology. The course covers the properties of nanomaterials, their production methods, characterization techniques, and applications in various fields. Additionally, it aims to enhance students' knowledge and competence in the field by evaluating the ethical and social dimensions of nanotechnology and its impact on society. |
| **Short Course Content** | Students will be able to describe the properties of nanomaterials and understand how they differ from macroscopic materials. Additionally, they will be able to explain the top-down and bottom-up methods used in the production of nanomaterials and compare their applications. Students will recognize various techniques used in the characterization of nanomaterials (such as SEM, TEM, AFM, XRD) and understand how these techniques work and what information they provide. They will also be able to describe the applications of nanotechnology in electronics, medicine, energy, environmental science, and other fields, and assess the benefits and challenges of these applications |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Acquire introduction-level knowledge and understanding of scientific and technological applications in the field of nanotechnology. | 1, 3, 5 | 1, 2 | A |
| **2** | Understand how nanomaterials differ from traditional materials. | 1, 3, 5 | 1, 2 | A |
| **3** | Recognize various techniques used in the characterization of nanomaterials and understand how these techniques work and what information they provide. | 1, 3, 5 | 1, 2 | A |
| **4** | Describe the applications of nanotechnology in various fields and assess the benefits and challenges of these applications. | 1, 3, 5 | 1, 2 | A |
| **5** | Gain the ability to discuss and theorize about future developments in the field of nanotechnology. | 1, 3, 7, 8, 13 | 1, 2, 13 | A, G |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Nanotechnology : principles and practices, Kulkarni, Sulabha K., Springer, 2014. |
| **Supporting References** | Introduction to nano: basics to nanoscience and nanotechnology, Sengupta, Amretashis, Sarkar, Chandan Kumar, Springer, 2015. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to Nanotechnology |
| **2** | Types and Properties of Nanomaterials |
| **3** | Types and Properties of Nanomaterials |
| **4** | Quantum Effect on Properties of Nanomaterials |
| **5** | Production Methods of Nanomaterials |
| **6** | Nanomaterial Characterization Techniques |
| **7** | Nanomaterial Characterization Techniques |
| **8** | Mid-Term Exam |
| **9** | Applications of Nanotechnology |
| **10** | Applications of Nanotechnology |
| **11** | Applications of Nanotechnology |
| **12** | Carbon-Based Nanomaterials |
| **13** | Advanced Nanostructures and Functional Materials |
| **14** | Self-Assembly and Nanofabrication |
| **15** | Ethical and Social Dimensions of Nanotechnology |
| **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 |  |  |  |
| 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) | 1 | 24 | 24 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 12 | 12 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 12 | 12 |
|  | **Toplam iş yükü** | | **136** |
|  | **Toplam iş yükü / 30** | | **4,53** |
|  | **Dersin AKTS Kredisi** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Presentation | 20 |
| **Final Exam** | 45 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 3 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist. Prof. Dr. Ersu LÖKÇÜ |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Hydrometallurgy |  |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 5 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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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** | Learning basic knowledge and principles of refining and purification of metals from raw materials by hydrometallurgical method and process. |
| **Short Course Content** | Preparation of aqueous solitions of metals from ores, concentrates or other sources, rafination by precipitation or electrolysis. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Knowing the basic principles and technologies of hydrometallurgy skill gains | 1 | 1 | A |
| **2** | Learn the techniques applied to recover metals from aqueous solutions. | 1, 12 | 1 | A |
| **3** | Gains the ability to solve leaching problems. | 2 | 10 | A |
| **4** | Researches hydrometallurgical applications for non-ferrous metals. | 6,7 | 15 | E, G |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Akdağ, M., Hidrometalurji: Temel Esasları ve Uygulamaları, Dokuz Eylül Üniversitesi Müh.Mim. Fak. Yayınları No:88, 1992, İzmir. |
| **Supporting References** | Burkin, A.R., Hidrometalurjik Süreçlerin Kimyası, çev. Doç.Dr. Tevfik Utine, TMMOB Yayınları,1988.  Ritcey, G.M., Ashbrook A.W. and Bor, F.Y., Solvent Extraction, Principles and  Applications to Process Metallurgy, Part I and II, 1984. |
| **Necessary Course Material** | Computer and projection device |

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| --- | --- |
| **Course Schedule** | |
| **1** | Definition and scope hydrometallurgy, hydrometallurgical processes. |
| **2** | Solid-liquid leaching: leaching reactives, dissolution mechanisms in leaching. |
| **3** | Solid-liquid leaching methods. |
| **4** | Solid-liquid leaching methods. |
| **5** | Mass balance in solid-liquid leaching and yield calculations. |
| **6** | Liquid-liquid leaching methods. |
| **7** | Continues system liquid-liquid leaching |
| **8** | Mid-Term Exam |
| **9** | Surface absorption processes: chemical absorption, physical absorption. |
| **10** | Applications of surface absorption processes. |
| **11** | Liquid membran technology. |
| **12** | Removal of metals from liquid solitions: precipitation, electrolysing. |
| **13** | Student presentation |
| **14** | Student presentation |
| **15** | Student presentation |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) | 1 | 4 | 4 |
|  | 7 | 2 | 14 |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
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| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 45 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 1 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 1 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 1 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Associate Professor  Belgin TANIŞAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Technology and Design of Semiconductors |  |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| √ | √ |  |  |  |

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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** | Explaining the production and characterization of semiconductors, which are one of the material types used in the electronic industry. |
| **Short Course Content** | Introducing the structural properties, production methods, characterization and application areas of semiconductor materials. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learning ways to reach the desired scientific knowledge. | 1, 2 | 1, 2, 5, 15 | A, G, E |
| **2** | Writing a report in accordance with the rules and presentation information. | 1, 2, 7 | 1, 2, 5, 15 | A, G, E |
| **3** | Necessary to increase the ability to use computer programs. | 1, 2, 7 | 1, 2, 5, 15 | A, G, E |
| **4** | To gain experience in oral questions and answers and presentation. | 3, 6, 7 | 1, 2, 5, 15 | A, G, E |
| **5** | Understanding and recognition of professional and ethical responsibility. | 3, 6, 7 | 1, 2, 5, 15 | A, G, E |
| **6** | Engineering research, the ability to understand the national and global influence. | 1, 2, 7 | 1, 2, 5, 15 | A, G, E |
| **7** | Understand the importance of lifelong learning and practice skills. | 3, 6, 7 | 1, 2, 5, 15 | A, G, E |
| **8** | Monitoring current issues in vocational skills. | 1, 2, 7 | 1, 2, 5, 15 | A, G, E |

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| --- | --- |
| **Main Textbook** | Streetman, B..G., Solid State Electronic Devices, Prentice Hall Series in Solid State Physical Electronics, Prentice Hall Inc., New Jersey |
| **Supporting References** | 1. Schroder, D.K., Semiconductor material and device characterization,, John Wiley&Sons, Inc., 1990,  2. Boylestad, R., Nashelsky, L., Elektronik Elemanlar ve Devre Teorisi,MEB Yayınları |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Explanation about text and subjects |
| **2** | Crystal properties and growth of semiconductors |
| **3** | Energy Bands and Charge Carriers in Semiconductors |
| **4** | Energy Bands and Charge Carriers in Semiconductors |
| **5** | PN Junctions |
| **6** | Presentation of homeworks |
| **7** | pn diodes; Tunnel diodess |
| **8** | The Junction Diodes; Tunnel Diodes |
| **9** | Photodiodes, LEDs and laser Diodes |
| **10** | Bipolar Junction Transistors, |
| **11** | Field Effect Transistors |
| **12** | Presentation of homeworks |
| **13** | Fabrication techniques of semiconductor devices |
| **14** | Fabrication techniques of semiconductor devices |
| **15** | Characterization of semiconductors |
| **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 |  |  |  |
| 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) | 2 | 20 | 40 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **145** |
|  | **Total workload / 30** | | **4.83** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Presentation | 25 |
| Presentation | 25 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 50 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 3 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 3 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. M. Celalettin BAYKUL |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Applications of Metallurgy |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 1 | 2 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | ✓ |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | To learn the raw material preparation processes applied to metallurgical raw materials, make application studies for production metallurgy in Metallurgical and Materials Engineering, examine the results, and gain the ability to work individually and as a team. |
| **Short Course Content** | Presentation of laboratory equipment, experimental components, and health-safety rules in lab. Within the course's scope, it aims to make various metallurgical applications by dividing the students into groups, comparing, discussing and evaluating the results. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Acquisition of theoretical and comprehensive knowledge in production metallurgy applications. | 1,6,7 | 1,2,5,11 | A,E,K |
| **2** | To learn pre-treatment techniques applied to metallurgical raw materials and production techniques in hydrometallurgy and powder synthesis. | 1,2 | 1,2,4,5 | A,E,K |
| **3** | Students learn the basic production methods and gain the ability to analyse the results of experiments with the ability to understand the relationships between parameters. | 1,2,5,13 | 1,3,6,10,12 | A,E,I,K |
| **4** | Acquiring knowledge about laboratory scale experiments, managing them and selecting and designing the process. | 1,2,3,4,5 | 1,2,3,5,6,7,12 | A,E,I,K |
| **5** | To gain the ability to reason about the causes and solutions of the problems that occur during the experimental process, to develop technical expression skills and to gain reporting skills. | 1,2,4,5,6,7 | 7,12,15 | A,E,I,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | Metallurgy Laboratory Pamphlet, and other resources defined for each Experiment. |
| **Supporting References** |  |
| **Necessary Course Material** | Use of pc, word and excel, data evaluation programs. |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to Course/Definition of Fundamentals -Safety Rules in Lab. |
| **2** | Raw material preparation processes applied to metallurgical raw materials. |
| **3** | Raw material preparation process applications applied to metallurgical raw materials. |
| **4** | Raw material preparation process applications applied to metallurgical raw materials. |
| **5** | Hydrometallurgical methods. |
| **6** | Cementation of copper. |
| **7** | Cementation of copper. |
| **8** | Mid-Term Exam |
| **9** | Self-Propagating High-Temperature Synthesis. |
| **10** | Production of Alloys by Self-Propagating High-Temperature Synthesis. |
| **11** | Production of Alloys by Self-Propagating High-Temperature Synthesis. |
| **12** | Density Measurement |
| **13** | Determination of Density and Hardness of Alloys Produced by Self-Propagating High Temperature Synthesis |
| **14** | Determination of Density and Hardness of Alloys Produced by Self-Propagating High Temperature Synthesis |
| **15** | Discussion and Conclusion Remarks |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 4 | 5 | 20 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 12 | 12 |
|  | **Total workload** | | **117** |
|  | **Total workload / 30** | | **3,9** |
|  | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Report | 15 |
| Report | 15 |
| Report | 15 |
| Report | 15 |
| **Final Exam** | 40 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| --- | --- | --- | --- |
| **LECTUTER(S)** | | | |
| **Prepared by** | Dr. Öğr. Üy. Alanur BİNAL AYBAR |  |  |
| **Signature(s)** |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| ALLOYING SYNTHESIS AND PERFORMANCE APPLICATIONS |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 1 | 2 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The aim of this course is to make application studies on alloy synthesis and its effects on performance in Metallurgical and Materials Engineering, to examine the results, and to gain the ability to work individually and as a team. |
| **Short Course Content** | Presentation of laboratory equipment and experimental components, and health safety rules in the lab. Within the course's scope, it aims to make different application studies by dividing the students into groups, comparing, discussing, and evaluating the results. Surface hardening of steels by carburization, increasing the strength of Al alloy by precipitation hardening, and alloy production by powder metallurgy will be carried out as laboratory work. |

|  |  |  |  |
| --- | --- | --- | --- |
| **Learning Outcomes of the Course** | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| Acquisition of theoretical and comprehensive knowledge in  **1** the applications of alloy synthesis and its effects on performance. | 1,6,7 | 1,2,5,11 | A,E,K |
| To learn surface treatments, strength enhancement  **2** mechanisms, and powder metallurgy techniques applied to metals. | 1,2 | 1,2,4,5 | A,E,K |
| Students learn the basic production methods and gain the  **3** ability to analyse the results of experiments with the ability to understand the relationships between parameters. | 1,2,5,13 | 1,3,6,10,12 | A,E,I,K |
| **4** Acquiring knowledge about laboratory scale experiments,  managing them and selecting and designing the process. | 1,2,3,4,5 | 1,2,3,5,6,7,12 | A,E,I,K |
| To gain the ability to reason about the causes and solutions  **5** of the problems that occur during the experimental process, to develop technical expression skills and to gain reporting  skills. | 1,2,4,5,6,7 | 7,12,15 | A,E,I,K |
| **6** |  |  |  |
| **7** |  |  |  |
| **8** |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | Alloying synthesis and performance applications laboratory pamphlet, and other resources defined for each Experiment. |
| **Supporting References** |  |
| **Necessary Course Material** | Use of pc, word and excel, data evaluation programs. |

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| **Course Schedule** |
| **1** Introduction to Course/Definition of Fundamentals -Safety Rules in Lab. |
| **2** Surface treatment of steels |
| **3** Hardening of steel by pack carburising |
| **4** Investigation of metallographic and hardening ability of steel hardened by pack carburisation method |
| **5** Precipitation hardening of aluminium alloys |
| **6** Application of precipitation hardening in aluminium alloy |
| **7** Determination and comparison of mechanical properties of precipitation hardened aluminium alloys under  different conditions |
| **8** Mid-Term Exam |
| **9** Determination and comparison of mechanical properties of precipitation hardened aluminium alloys under  different conditions |
| **10** Powder metallurgy |
| **11** Production of alloys by powder metallurgy |
| **12** Determination of mechanical properties of alloys produced by powder metallurgy |
| **13** Heat treatment of alloys produced by powder metallurgy |
| **14** Determination and characterisation of mechanical properties of alloys produced by powder metallurgy and  heat treated. |
| **15** Discussion and Conclusion Remarks |
| **16,17** Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 4 | 5 | 20 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 12 | 12 |
|  | **Total workload** | | **117** |
| **Total workload / 30** | | **3,9** |
| **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 15 |
| Quiz | 15 |
| Homework | 15 |
| Bir öğe seçin. | 15 |
| Bir öğe seçin. | 40 |
| **Final Exam** | 100 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | |
| **Prepared by** | Dr. Işın AKAY ERDOĞAN |  |  |
| **Signature(s)** |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Applications of Ceramic Materials |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 1 | 2 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | Comprehensive understanding of the theoretical subjects covered in ceramic materials courses, dealing with the probable problems faced in industry, learning basic production methods in the fields of ceramic powder synthesis and fabrication of ceramic materials, applying the engineering knowledge gained in classes to design and conduct lab-scale experiments, to analyze their results, and to work as teams. |
| **Short Course Content** | Presentation of laboratory equipment, experimental components and health-safety rules in lab. Experiences on ceramic powder synthesis and shaping-compacting of ceramic bodies, physical and mechanical characterization of ceramic bodies, Discussion and conclusion remarks |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Comprehensive understanding of the application subjects covered in ceramic materials courses. | 1,6,7 | 1,2,5,11 | A,E,K |
| **2** | Additionally, students will gain an understanding about the basic concepts of production processes and the relationships between the parameters, and will be able to analyze the results of experiments | 1,2 | 1,2,4,5 | A,E,K |
| **3** | Getting information about planning and operating laboratory scale experiments, design and selection of process | 1,2,5,13 | 1,3,6,10,12 | A,E,I,K |
| **4** | Creation of new opportunities in ceramic industry | 1,2,3,4,5 | 1,2,3,5,6,7,12 | A,E,I,K |
| **5** | Moreover, oral and written communication skills of the students are intended to be improved by holding conversations before, during, and after the experiments to discuss the setting up the experiments and their results,  and by preparing a formal written report |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | Ceramic Materials Laboratory Pamphlet, and other resources defined for each experiment. |
| **Supporting References** |  |
| **Necessary Course Material** | Laboratory equipments |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to Course |
| **2** | Definition of Fundamentals -Safety Rules in Lab. |
| **3** | Processing-compacting of ceramic materials |
| **4** | Processing-compacting of ceramic materials |
| **5** | Physical properties of ceramic materials |
| **6** | Physical properties of ceramic materials |
| **7** | Determination of water absorption, density, porosity |
| **8** | Mid-Term Exam |
| **9** | Determination of water absorption, density, porosity |
| **10** | Determination of bending strength of ceramic bodies |
| **11** | Determination of bending strength values of ceramic bodies |
| **12** | Determination of hardness and fracture toughness values of ceramic bodies |
| **13** | Determination of hardness and fracture toughness values of ceramic bodies |
| **14** | Discussion and Conclusion Remarks |
| **15** | Discussion and Conclusion Remarks |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 4 | 5 | 20 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 12 | 12 |
|  | **Total workload** | | **117** |
|  | **Total workload / 30** | | **3,9** |
|  | **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 15 |
| Quiz | 15 |
| Homework | 15 |
| Bir öğe seçin. | 15 |
| Bir öğe seçin. |  |
| **Final Exam** | 40 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc.Prof.Dr.Bilge YAMAN ISLAK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Polymer Material Applications |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 1 | 2 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| ✓ | ✓ | ✓ |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | To provide a comprehensive understanding of theoretical issues in polymers and polymeric materials, as well as to encounter common problems in research and industry and to discuss their causes.  Learning the preparation processes in the production of polymeric materials, applying current and different production technique examples in production processes, using the engineering knowledge gained through applications in design and carrying out laboratory-scale experiments, examining the results and gaining the ability to work in a team. |
| **Short Course Content** | Introduction of laboratory equipment and experimental components, learning the health and safety rules in the laboratory. Obtaining and shaping thermoset and thermoplastic polymers in different structures, polymer-based composite production, comparison, discussion and evaluation of the results. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Acquiring theoretical and comprehensive knowledge on polymeric materials, nanofibers and microfluidics | 1, 6, 7 | 1, 2, 5, 11 | A, E, K |
| **2** | Learning laboratory and clean room safety rules, spinning technologies, nanofiber and microfluidic production techniques, and laboratory-on-a-chip principles | 1, 2 | 1, 2, 4, 5 | A, E, K |
| **3** | Students will be able to learn the basic production methods of high-tech polymeric materials, understand the relationships between parameters and gain the ability to analyze experimental results | 1, 2, 5, 13 | 1, 3, 6, 10, 12 | A, E, I, K |
| **4** | Obtaining information about laboratory-scale experiments, managing them and selecting; and designing the process | 1, 2, 3, 4, 5 | 1, 2, 3, 5, 6, 7, 12 | A, E, I, K |
| **5** | To develop ideas about the causes and solutions to the problems that occur during the experiment process, to develop technical expression skills and to gain reporting skills | 1, 2, 4, 5, 6, 7 | 7, 12, 15 | A, E, I, K |

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| **Main Textbook** | Avci H. Polimerler: Özellikleri ve Uygulamaları, ESOGU Yayınevi. 2021. |
| **Supporting References** | 1. SAÇAK Mehmet, Polimer Kimyası, Fersa Matbaacılık, Ankara 2002  2. SAÇAK Mehmet, Polimer Teknolojisi, Baran Ofset, Ankara, 2005 |
| **Necessary Course Material** | Computer (connected to the internet) and projector |

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| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to the course and basic definitions |
| **2** | Laboratory and clean room safety rules |
| **3** | Overview of spinning technologies |
| **4** | Nanofiber production by electrospinning process |
| **5** | Nanofiber production by electrospinning process |
| **6** | Characterization of nanofibers |
| **7** | Characterization of nanofibers |
| **8** | Mid-Term Exam |
| **9** | Thermosetting polymer-based microfluidic production |
| **10** | Thermoplastic polymer-based microfluidic production |
| **11** | Microfluidic characterization |
| **12** | Microfluidic characterization |
| **13** | Application of lab-on-chip manufacturing principle |
| **14** | Application of lab-on-chip manufacturing principle |
| **15** | General review and discussion |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 4 | 5 | 20 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 12 | 12 |
|  | **Total workload** | | **117** |
|  | **Total workload / 30** | | **3,9** |
|  | **Course ECTS Credit** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Report | 15 |
| Report | 15 |
| Report | 15 |
| Report | 15 |
| **Final Exam** | 40 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Hüseyin Avcı |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Design In Metallurgical and Materials Engineering |  |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 2 | 2 | 4 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | 151916345 – Alloy Design |
| **Objectives of the Course** | The aim is to learn cost estimation methods, to enable the application of various theoretical principles learned in this and previous courses, and to provide students with experience in design and production in their field through the projects they will prepare. It aims to encourage intra-disciplinary and interdisciplinary teamwork and to develop this skill. |
| **Short Course Content** | Project work and cost analyses on cost estimation, alternative investments, safety, ethical and environmental constraints; the design, planning, and project management of materials, devices, and production methods used in metallurgical and materials engineering processes; the design of devices used in the production of materials. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Defines, examines, explains, formulates, and solves cost estimation methods | 1, 8, 9 | 1 | A |
| **2** | Defines, examines, explains, formulates, and solves design methods with a focus on cost and performance outcomes | 1, 8, 9 | 1 | A |
| **3** | Recognizes the importance of safety, ethical, and environmental constraints and conditions in the design of devices, materials, and production processes | 1, 6, 7, 8, 9 | 2, 6 | E |
| **4** | Works as a team while preparing the project, examines, defines, collects data, synthesizes to design a complex system, interprets, presents, discusses, and evaluates | 1, 6, 7, 8, 9 | 2, 6 | E |
| **5** |  |  |  |  |
| **6** |  |  |  |  |

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| --- | --- | --- |
| **Main Textbook** | | Michael Ashby, Materials Selection in Mechanical Design, Butterworth-Heinemann, 2018 |
| **Supporting References** | | Prof. Dr. Fehim Fındık,Prof. Dr. Sefer Cem Okumuş,Dr. Öğr. Üyesi Murat Çolak, Malzeme Seçimi ve Uygulamaları, Seçkin Yayıncılık, 2018 |
| **Necessary Course Material** | |  |
| **Course Schedule** | | |
| **1** | Explanation of the Course's Purpose and Content: Introduction to Design | |
| **2** | Process, Material, and Method Design according to the Determined Topic | |
| **3** | Introduction to the Design of Metal and Metal Alloy Materials | |
| **4** | Introduction to the Design of Ceramic Materials | |
| **5** | Introduction to the Design of Polymer Materials | |
| **6** | Introduction to the Design of Composite Materials | |
| **7** | Material Production Methods | |
| **8** | Mid-Term Exam | |
| **9** | Planning Related to the Project | |
| **10** | Starting the Project Implementation | |
| **11** | Continuation of the Project Implementation | |
| **12** | Continuation of the Project Implementation | |
| **13** | Continuation of the Project Implementation | |
| **14** | Continuation of the Project Implementation | |
| **15** | Project Evaluations | |
| **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 | 4 | 56 |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| Homework |  |  |  |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 30 | 30 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1 | 1 |
| Studying for Mid-Term Exam | 1 | 20 | 20 |
| Final Exam |  |  |  |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **107** |
|  | **Total workload / 30** | | **3.56** |
|  | **Course ECTS Credit** | | **4** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 50 |
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| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Report** | 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 3 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 4 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr. Reşat Can ÖZDEN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Physical Metallurgy |  |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | 151915342 Phase Diagrams  151916345 Alloying Design 151916336 Heat Treatment of Metals |
| **Objectives of the Course** | To understand phase transformation characteristics, to explain the relationships between phase transformations and material properties, to comment on the kinetics of metallurgical processes. |
| **Short Course Content** | Diffusion in Crystal Structures, Nucleation and Growth, Solidification, Recrystallization, Precipitation, Diffusion Controlled Growth, Martensitic Transformations |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Describe the kinetics of metallurgical processes | 1 | 1 | A |
| **2** | Being able to establish a relationship between the kinetics of the process and the material properties | 2 | 2 | B |
| **3** | Being able to design metallurgical processes | 3 | 8 | A |
| **4** | |  |  |  |
| **5** | |  |  |  |
| **6** | |  |  |  |
| **7** | |  |  |  |
| **8** | |  |  |  |

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| **Main Textbook** | J. D. Verhoeven, Fundamentals of Physical Metallurgy, Wiley, 1975 |
| **Supporting References** | M. K. Şeşen, Metalurjik Süreçlerin Kinetiği, İTÜ Yayınları, 1998.  P. Shewmon, Diffusion in Solids, TMS, Pennsylvania, 1989.  D. A. Porter, K. E. Easterling, M. Sherif, Phase Transformations in Metals and Alloys, Third Edition, CRC Pres, 2009. |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Diffusion – Ficks First Law |
| **2** | Diffusion – Ficks Second Law |
| **3** | Diffusion in Multi Phases |
| **4** | Substitutional Diffusion |
| **5** | Diffusion – Chemical Potential – Fast Diffusion Regions |
| **6** | Nucleation – Liquid/Solid |
| **7** | Nucleation – Solid/Solid |
| **8** | Mid-Term Exam |
| **9** | Solidification – Pure Metals |
| **10** | Solidification - Alloys |
| **11** | Recovery and Recrystallization |
| **12** | Precipitation from solid state |
| **13** | Diffusion controlled growth |
| **14** | Martensitic Transformations |
| **15** | Application Examples in Physical Metallurgy |
| **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,….) |  |  |  |
| Homework |  |  |  |
| Quiz Exam | 2 | 1 | 2 |
| Studying for Quiz Exam | 2 | 5 | 10 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **93** |
| **Total workload / 30** | | **3.1** |
| **Course ECTS Credit** | | **3** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 20 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at  least one foreign language | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself | 2 |
| **9** | Awareness of professional and ethical responsibility | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Mustafa ANIK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| METALLURGICAL AND MATERIALS ENGINEERING PROJECT  PREPARATION |  |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 2 | 2 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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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 is to equip senior students of the Metallurgical and Materials Engineering department with competencies in project processes. Within the scope of the course, students will learn the stages of project planning, implementation, evaluation, and reporting, thus preparing for their professional careers. Additionally, this course serves as a preparation for their graduation thesis, aiming to provide students with experience in applying theoretical  knowledge to practice and in project writing. |
| **Short Course Content** | This course equips Metallurgical and Materials Engineering students with the skills to learn and apply project processes. Students develop their teamwork and communication skills by experiencing the stages of project planning, implementation, and evaluation. Additionally, they gain practical knowledge in cost analysis, risk management, and reporting. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Students learn the stages of planning, implementing, and  evaluating engineering projects. | 1,5 | 11,12,13,14 | D |
| **2** | They gain competence in project management, time  management, and cost analysis. | 1,5 | 11,12,13,14 | D |
| **3** | They develop teamwork, communication, and task  distribution skills. | 6 | 11,12,13,14 | D |
| **4** | They apply techniques for project reporting, presentation  preparation, and visualization. | 7 | 11,12,13,14 | G |
| **5** | They improve their projects by conducting risk analysis and  adhering to safety and ethical guidelines. | 7,9,10 | 11,12,13,14 | E |
| **6** | |  |  |  |
| **7** | |  |  |  |
| **8** | |  |  |  |

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| --- | --- |
| **Main Textbook** | - |
| **Supporting References** | - |
| **Necessary Course Material** | - |

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| --- | --- |
| **Course Schedule** | |
| **1** | Introduction and Course Overview |
| **2** | Development of Project Ideas |
| **3** | Development of Project Ideas |
| **4** | Development of Project Ideas |
| **5** | Project Design and Engineering Analysis |
| **6** | Project Design and Engineering Analysis |
| **7** | Project Design and Engineering Analysis |
| **8** | Mid-Term Exam |
| **9** | Project Planning and Time Management |
| **10** | Cost and Resource Management |
| **11** | Risk Management and Safety |
| **12** | Project Writing |
| **13** | Project Writing |
| **14** | Project Writing |
| **15** | Project Submission |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Time (Hour)** | **Total Workload (Hour)** |
| Course Time (number of course hours per week) | 14 | 4 | 56 |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| Homework | 2 | 10 | 20 |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) |  |  |  |
| Project (Preparation and presentation time included) | 1 | 30 | 30 |
| Presentation (Preparation time included) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam |  |  |  |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **126** |
| **Total workload / 30** | | **4,2** |
| **Course ECTS Credit** | | **4** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Presentation | 30 |
| Homework | 5 |
| Homework | 5 |
|  |  |
| **Final Exam** |  |
| Report | 60 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 3 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 5 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 4 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 5 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| --- | --- | --- | --- | --- |
| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Mustafa ANIK | Prof. Dr. Hakan GAŞAN | Dr. Öğr. Üyesi Reşat Can ÖZDEN | Dr. Öğr. Üyesi Ersu LÖKÇÜ |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| STAJ III – ORGANIZATION PRACTISE | 151917XXX |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 0 | 0 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | One of the courses, either the Casting Internship or the Manufacturing Internship, must be taken before this course. |
| **Objectives of the Course** | The aims are to apply the theories learned in academic courses, to gain industry knowledge, to develop professional skills, to understand workplace culture, to establish professional connections, to meet industry experts, and to enhance personal competencies. |
| **Short Course Content** | Topics that students pursuing an engineering career need to know at a minimum level about business operations are examined. These include facility planning, production systems, cost analysis, organizational charts, quality control activities, and the environmental impacts of the business. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understanding the organizational structures of businesses, the relationships between departments, and hierarchical arrangements, and evaluating the impact of these structures on the efficiency of the business. | 1, 4, 6, 10, 12 | 11, 12, 15 | E |
| **2** | Recognizing different management and leadership styles and analyzing the impact of these styles on employee motivation and performance. | 1, 4, 6, 10, 12 | 11, 12, 15 | E |
| **3** | Learning the methods used for planning, executing, and continuously improving business processes, and applying strategies to optimize workflows and increase efficiency. | 1, 4, 6, 10, 12 | 11, 12, 15 | E |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | - |
| **Supporting References** | - |
| **Necessary Course Material** | - |

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| --- | --- |
| **Course Schedule** | |
| **1** | Evaluation of Internship Reports: |
| **2** | Evaluation of Internship Reports: |
| **3** | Evaluation of Internship Reports: |
| **4** | Evaluation of Internship Reports: |
| **5** | Evaluation of Internship Reports: |
| **6** | Evaluation of Internship Reports: |
| **7** | Evaluation of Internship Reports: |
| **8** | Mid-Term Exam |
| **9** | Evaluation of Internship Reports: |
| **10** | Evaluation of Internship Reports: |
| **11** | Evaluation of Internship Reports: |
| **12** | Evaluation of Internship Reports: |
| **13** | Evaluation of Internship Reports: |
| **14** | Evaluation of Internship Reports: |
| **15** | Evaluation of Internship Reports: |
| **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) | 1 | 60 | 60 |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| 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) | 1 | 60 | 60 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam |  |  |  |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credit** | | **2** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term |  |
| Quiz |  |
| Homework |  |
|  |  |
| **Final Exam** |  |
| **BOARD** | 100 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 3 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 4 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr. Kerem AYBAR |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Composite Materials |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 | 0 | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ | √ | √ |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Teaching the composite materials; fabrication techniques, applications and mechanical properties of composite materials. |
| **Short Course Content** | Description of the composite, advantages and disadvantages, clasification, reinforcement materials, matrix materials, fabrication techniques, mechanical analysis. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Uderstanding the composite materials | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **2** | Recognise the reinforcements | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **3** | Recognise the matrixs | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **4** | Learning the productionmethods | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **5** | Mechanical analysis | 1,3,5,11,12 | 1,5,11 | A,B,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Kompozit malzemelere giriş |
| **Supporting References** | Metals handbook |
| **Necessary Course Material** | PC and projection |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | The description of composites, advantages and disadvantages |
| **2** | The clasifications of composites |
| **3** | Reinforcement materials |
| **4** | Reinforcement materials |
| **5** | Reinforcement materials |
| **6** | Matrix materials |
| **7** | Matrix materials |
| **8** | Mid-Term Exam |
| **9** | Fabrication methods of composites |
| **10** | Fabrication methods of composites |
| **11** | Fabrication methods of composites |
| **12** | Mechanical analysis of composites |
| **13** | Mechanical analysis of composites |
| **14** | Mechanical analysis of composites |
| **15** | Mechanical analysis of composites |
| **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 | 1 | 14 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 20 | 20 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Toplam iş yükü** | | **98** |
|  | **Toplam iş yükü / 30** | | **3,3** |
|  | **Dersin AKTS Kredisi** | | **3** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Homework |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 5 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. İbrahim ÇELİKYÜREK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Production Processes of Ceramic Materials |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **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** |
|  | **√** |  |  |  |

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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** | Identify basic raw materials used in traditional ceramic production, calculating mineralogical from chemical analaysis and vice versa, learning production processes of ceramic products. |
| **Short Course Content** | Describtion and classification of raw materials usen in traditional ceramic production, mineralogical and chemical properties of raw materials, test methods applied to ceramic raw materials. Production processes in ceramic tiles, sanitaryware, porcelain, masonary products, refractory materials etc. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Defines basic concepts about traditional ceramic products | 1, 2, 4 | 1 | A |
| **2** | Learns traditional ceramic raw materials and their properties. | 1, 2, 4 | 1 | A |
| **3** | Learns ceramic production processes. | 1, 6, 7 | 1, 12, 15 | A, E, G |
| **4** | Learns the calculation of chemical and mineralogical analyzes of ceramic products, based on their body composition. | 1, 2 | 6 | A |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Reed, J.S, Introduction to the Principles of Ceramic Processing, 1988.  Tanışan, H.H.,Mete, Z., Seramik Teknolojisi ve Uygulaması, 1988. |
| **Supporting References** | Arcasoy, A., Seramik Teknolojisi, Marmara Üniversitesi Yayınları, 1983. |
| **Necessary Course Material** | Computer and projection device |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Definition of ceramic and classification of ceramic materials |
| **2** | The classification of traditional ceramic raw materials: plastic and non-plastic raw materials |
| **3** | Chemical and mineralogical structure of plastic raw materials, properties and use |
| **4** | Chemical and mineralogical structure of non-plastic raw materials, properties and use |
| **5** | The test methods applied for the traditional ceramic raw materials |
| **6** | The production of ceramic wall and floor tiles |
| **7** | The production of ceramic wall and floor tiles |
| **8** | Mid-Term Exam |
| **9** | The production of ceramic sanitary wares |
| **10** | The production of porcelain wares |
| **11** | The production of brick and tiles |
| **12** | The production of refractory materials |
| **13** | Student presentations |
| **14** | Student presentations |
| **15** | Student presentations |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) | 1 | 4 | 4 |
|  | 7 | 2 | 14 |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam.** | 45 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 1 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 1 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 1 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Associate Professor  Belgin TANIŞAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Defense Industry Materials | 151918404 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 | 0 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| 1 | 4 |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The main objective of the course is to enable students to understand the basic properties, production techniques, areas of use and performance requirements of materials used in the defense industry. |
| **Short Course Content** | This course examines the role of various metals, ceramics, polymers and composite materials in defense applications. It also focuses on the durability, strength, corrosion resistance, thermal stability and other mechanical properties of these materials. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Define metal, ceramic, polymer and composite materials commonly used in defense industry applications. Describe the basic physical, chemical and mechanical properties of these materials. | 1,2,4 | 1,4,7 | A,D,E,G |
| **2** | Describe the basic techniques and processes used in the production of defense materials. Explain how advanced manufacturing technologies (e.g., 3D printing, powder metallurgy, sintering) are used in the defense industry. | 2,4,9 | 1,4,7 | A,D,E,G |
| **3** | Evaluate the performance requirements of materials (e.g., strength, hardness, corrosion resistance). Analyze material behavior under different application conditions and make appropriate material selection. | 2,3 | 2,7,10 | A,D,E,G |
| **4** | Compare the advantages and disadvantages of these materials in their areas of use. | 1,2,3,4 | 1,4,2,8 | A,D,E,G |
| **5** | Comprehend basic approaches and strategies for the development of new materials for the defense industry and the improvement of existing materials.  Produce innovative solutions in material development processes. | 9,10 | 10,13 | A,D,E,G |
| **6** | Have knowledge of national and international standards, regulations and certification processes related to the use of materials in the defense industry. Understand the effects of these standards on material selection and use. | 9,11 | 1,2,10 | A,D,E,G |
| **7** | Identify material problems for the defense industry and develop solution proposals for these problems.  Ability to use analytical thinking skills to improve material performance. | 2 | 2,10,12 | A,D,E,G |
| **8** | Ability to work in teams and use effective communication skills in project-based learning activities.  Developing technical report writing and presentation skills. | 6,7 | 12,15 | A,D,E,G |

|  |  |
| --- | --- |
| **Main Textbook** | Manufacturing Technology for  Aerospace Structural Materials, F.C. Campbell |
| **Supporting References** | Aerospace Materials, Series in Materials Science and Engineering  Series Editors: B Cantor, Department of Materials, University of Oxford, UK  M J Goringe, School of Mechanical and Materials  Engineering, University of Surrey, UK |
| **Necessary Course Material** | Laptop and Power Point Equipment |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Overview of defense industry materials  Basic principles of material science  Classification of materials used in the defense industry |
| **2** | Mechanical tests (tensile, compression, impact, etc.)  Microstructure analysis techniques (SEM, TEM, etc.)  Thermal and chemical analysis methods |
| **3** | Advanced manufacturing methods (3D printing, additive manufacturing, etc.)  Nanotechnology and microfabrication techniques  Material processing and shaping techniques |
| **4** | Metal Materials as Defense Industry Materials:  Steels and alloys  Light metals (aluminum, titanium, etc.)  High temperature alloys (superalloys) |
| **5** | Ceramics as Defense Industry Materials  Armor ceramics  High temperature ceramics  Ceramics for electronic and optical applications |
| **6** | Polymers and Composites as Defense Industry Materials Fiber-reinforced composites  Nano-composites and advanced composite materials |
| **7** | Lightweight Construction Materials:Lightweight material design and applications  High strength lightweight materials  Aerodynamic construction materials |
| **8** | Mid-Term Exam |
| **9** | Smart materials; Piezoelectric, thermoelectric and magnetoelectric materials |
| **10** | Functional coatings and surface engineering |
| **11** | Ballistic and Protective Materials:  Ballistic performance and test methods  Explosive resistant materials |
| **12** | Armor materials and design principles |
| **13** | Chemical, Biological, Radiological, Nuclear Weapons |
| **14** | Material recycling in the defense industry  Sustainable material selection and use  Environmental impacts |
| **15** | R&D processes in defense industry materials  Innovative materials and applications  Future materials and trends |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) | 1 | 4 | 4 |
|  | 7 | 2 | 14 |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. | 45 |
| **Final Exam** | 100 |
| **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** | Having sufficient knowledge in engineering subjects related to mathematics, science and Metallurgical and Materials Engineering; ability to apply theoretical and applied knowledge in these fields and to model and solve engineering problems. | 4 |
| **2** | Ability to identify, define, formulate and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | Ability to design a complex system, process, device or product to meet specific requirements under realistic constraints and conditions by applying modern design methods. | 4 |
| **4** | Ability to develop, select and use modern techniques and tools required for engineering applications encountered as a Metallurgical and Materials Engineer; ability to use information technologies effectively. | 2 |
| **5** | Ability to design experiments, conduct experiments, collect data, analyze and interpret results to examine engineering problems. | 1 |
| **6** | Ability to work individually, within and between disciplines effectively. | 2 |
| **7** | Ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | Awareness of the necessity of lifelong learning; ability to access information, follow developments in science and technology and constantly renew oneself. | 2 |
| **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 effects of engineering practices on health, environment and safety in universal and societal dimensions and contemporary issues; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality awareness, quality control and sustainability in engineering practices, material selection, product development and production processes. | 1 |
| **13** | The ability to approach problems encountered in engineering practices with self-confidence. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. Neşe ÖZTÜRK KÖRPE |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Clean Energy & Design |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 | 0 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | ✓ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The aim is to ensure that students become aware of clean energy sources and sustainable design, gain proficiency in these areas, and encourage them to use this knowledge to develop environmentally friendly projects in the future. |
| **Short Course Content** | It includes the examination of how clean energy sources are utilized, the technologies, systems, and engineering materials used in energy production. Additionally, it involves conveying the fundamental principles of designing, implementing, and performing cost analysis of clean energy systems to students through practical projects and applications. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The introduction of how clean energy sources are utilized, the technologies and systems used in energy production. | 3, 5 | 1 | A, B |
| **2** | Providing information on energy efficiency and energy conservation, and teaching design and implementation methods to enhance energy efficiency. | 1, 3 | 1, 10 | A, B, D |
| **3** | Energy storage and conversion technologies are used in various application areas such as renewable energy systems, electric vehicles, smart grids, and portable electronic devices. | 1, 3 | 1 | A, B |
| **4** | The design, integration, and optimization of energy storage and conversion systems, including performance analysis and efficiency improvement of these systems. | 1, 3, 7, 8, 13 | 1, 14, 15 | A, J, G |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
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| --- | --- |
| **Main Textbook** | Clean energy, Ronald Dell, David Anthony James Rand, Royal Society of Chemistry, 2004. |
| **Supporting References** | Renewable Energy Conversion Systems, Muhammad Kamran, Muhammad Rayyan Fazal,Academic Press, 2021. |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Introduction and Course Overview |
| **2** | The Significance and Classification of Clean Energy Sources |
| **3** | The Significance and Classification of Clean Energy Sources |
| **4** | Technologies and Systems in Clean Energy Sources |
| **5** | Energy Storage and Conversion Technologies |
| **6** | Energy Storage and Conversion Technologies |
| **7** | Energy Storage and Conversion Technologies |
| **8** | Mid-Term Exam |
| **9** | Electrochemical Energy Storage Technologies |
| **10** | Li-ion Batteries |
| **11** | Li-Ion Battery Design |
| **12** | Supercapacitors |
| **13** | Fuel Cells |
| **14** | Desalination Batteries |
| **15** | Future Technologies and Trends |
| **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 | 1 | 14 |
| Homework | 2 | 15 | 30 |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) |  |  |  |
| Project (Preparation and presentation time included) | 1 | 20 | 20 |
| Presentation (Preparation time included) | 1 | 5 | 5 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 14 | 14 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 14 | 14 |
|  | **Toplam iş yükü** | | **143** |
|  | **Toplam iş yükü / 30** | | **4,77** |
|  | **Dersin AKTS Kredisi** | | **5** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 25 |
| Homework | 5 |
| Homework | 5 |
| Project Observation | 20 |
| Presentation | 10 |
| **Final Exam** | 35 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 5 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 3 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 2 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist. Prof. Dr. Ersu LÖKÇÜ |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Surface Processes of Metals |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 | 0 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | √ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The course aims to impart fundamental knowledge, principles, and technologies for metal surface processes. |
| **Short Course Content** | Introduction, measurement and preparation of metal surfaces, diffusion, corrosion and its control, wear, surface hardening processes, various coating methods, and surface treatment of non-ferrous metals. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understands the significance of surface measurement and preparation, wear, and corrosion for surface treatments. | 1, 2 | 1, 2, 5, 11 | A, B, K |
| **2** | Explains how to use the diffusion in surface treatments. | 1, 2 | 1, 2, 5, 11 | A, B, K |
| **3** | Explains the fundamentals of surface hardening techniques. Comprehending its differences, determines the surface hardening method most suitable for a specific material. | 1, 2, 4, 8, 12 | 1, 2, 5, 8, 11 | A, B, K |
| **4** | Learns the differences in coating methods, application areas and techniques. | 1, 2, 4, 8, 12 | 1, 2, 5, 8, 11 | A, B, K |
| **5** | Compares the surface hardening processes and coating techniques and chooses to use them in the correct application. | 1, 2, 4, 8, 12 | 1, 2, 5, 8, 11 | A, B, K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | 1. Metals Handbook (1983), Surface cleaning, finishing and coating, ASM 2. İsfendiyaroğlu, A. V Saraç, S., (1980), Elektrokimyanın Endüstriyel Uygulaması, İstanbul, İTÜ. |
| **Supporting References** | Internet databases. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction, metal surface measurement and preparation |
| **2** | Introduction, metal surface measurement and preparation |
| **3** | Diffusion |
| **4** | Corrosion and its prevention |
| **5** | Wear |
| **6** | Thermal surface hardening processes |
| **7** | Thermochemical surface hardening processes |
| **8** | Mid-Term Exam |
| **9** | Thermochemical surface hardening processes |
| **10** | Thermochemical surface hardening processes |
| **11** | Coatings |
| **12** | Coatings |
| **13** | Coatings |
| **14** | Coatings |
| **15** | Surface treatments of non-ferrous metals |
| **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 | 1 | 2 |
| 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) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1 | 1 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 10 |
| Quiz | 10 |
|  |  |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | |
| **Prepared by** | Dr. Işın AKAY ERDOĞAN |  |  |
| **Signature(s)** |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Failure Analysis |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **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** |
| √ | √ |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The main objective of the course, is to introduce and investigating the root causes of failures and implementing the systematic problem-solving techniques |
| **Short Course Content** | Description and objectives, general description and classification of failure analysis and as well as the analysis procedure sequence, the effective factors on failure of materials, the relationship with failure analysis and the materials itself, and the assessment of general requirements about the relationship among the materials and failure modes. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | General description of failure analysis | 1,2,5 | 1,4,5,8 | A,B,D,E,G,J,K |
| **2** | Define and classify failure of materials | 1,2,3,4,5 | 1,4,5,8 | A,B,D,E,G,J,K |
| **3** | Evaluate and describe the root causes of failures | 4,5 | 1,4,5,8 | A,B,D,E,G,J,K |
| **4** | Case studies of different failures | 2,6,10,11,12,13 | 1,4,5,8 | A,B,D,E,G,J,K |
| **5** | to gain the inter disciplinary relations by personal design projects | 4,6,7,10,11,13 | 1,4,5,8 | A,B,D,E,G,J,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | Daniel P. Dennies, How to Organize and Run a Failure Investigation ASM International Metals Park, Ohio, 2005 USA ISBN: 0-87170-811 |
| **Supporting References** |  |
| **Necessary Course Material** | Reading, comprehension and presentations |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Information about course scope, execution, evaluation |
| **2** | definition of failure analysis, and classification |
| **3** | Understanding the failure |
| **4** | Probable causes of failure |
| **5** | Evaluating the likelihood of failures |
| **6** | The working environment effects on failure |
| **7** | Fracture and fracture mechanics and relationship with the failure |
| **8** | Mid-Term Exam |
| **9** | Macroscopic investigation of fractures and fractography |
| **10** | Objectively and clearly identify failure |
| **11** | The corrective actions |
| **12** | The effect of corrective actions |
| **13** | Case studies |
| **14** | Case studies and reporting the failures |
| **15** | Case studies and reporting the failures |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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 | 1 | 2 |
| Studying for Quiz Exam | 2 | 4 | 8 |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  | 0 |
| Presentation (Preparation time included) | 1 | 4 | 4 |
|  | 7 | 2 | 14 |
|  |  |  |  |
| Mid-Term Exam | 1 | 1 | 1 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 50 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 3 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 5 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| --- | --- | --- | --- | --- |
| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Dr. Bedri BAKSAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Glass Technology |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **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** |
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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | The main objective of the Course, is to gain knowledge of structure and properties of glass materials, knowledge of designing, production procedure and methods |
| **Short Course Content** | Definition of glass, chemical composition and structure, viscosity, raw materials for glass-making, physical, chemical and thermal properties, mechanical, electric and optical properties of glass, glass-ceramics, different types of glass, glass-making furnaces, coatings and manufacturing techniques, application areas of glass materials. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Analyzing of engineering problems with the knowledge of glass technology | 1, 2, 4, 13 | 1, 2, 5 | A, D, K |
| **2** | Explanation of designing and production procedure of glass | 1, 2, 5, 8 | 1, 2, 5, 11, 12 | A, D, K |
| **3** | Provide a solution for problems of glass sector | 1, 4, 5, 8, 12 | 1, 2, 4, 7 | A, D, K |
| **4** | Creation of new opportunities in glass industry | 1, 2, 4,5,12 | 1, 2, 5 | A, D, K |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | 1. Cam; Kimyası, Özellikleri, Uygulaması, Duran KOCABAĞ, Birsen Yayınevi, 2002  2. Cam teknolojisi, Bekir KARASU, Nuran AY, MEB, 2000 |
| **Supporting References** | 1. W.Vogel, Glass Chemistry, Springer-Verlag, Berlin, 1994  2. R.H. Doremus, Glass Science, John Wiley and Sons Inc., 1994 |
| **Necessary Course Material** | Computer |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Introduction to glass technology, definition and chemical composition of glass |
| **2** | Structure of glass, raw materials, glass-making materials |
| **3** | Viscosity, phase transformations, crystallization of glass |
| **4** | Types of glass |
| **5** | Manufacturing techniques |
| **6** | Manufacturing techniques |
| **7** | Manufacturing techniques |
| **8** | Mid-Term Exam |
| **9** | Raw materials, control and comprise of color in glass, glass-making furnaces |
| **10** | Electrical and optical properties of glass |
| **11** | Coating and coating techniques |
| **12** | Application areas of glass and glass sector |
| **13** | Glass and Refractories |
| **14** | Technical applications of ceramic materials |
| **15** | The coating techniques of glass materials |
| **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 | 1 | 10 | 10 |
| 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 | 1 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **Course ECTS Credit** | | **5** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 20 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc.Prof.Dr.Bilge YAMAN ISLAK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Non Destructive Testing |  |

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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** |
|  | ✓ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The aim of this course is to provide students with a general understanding of non-destructive testing methods used to evaluate the condition of metal-based materials. |
| **Short Course Content** | The role of NDT in quality assurance. Applications of the most commonly used NDT methods in metallurgy and materials engineering, including ultrasonic, radiographic, liquid penetrant, magnetic particle, and eddy current testing. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The Importance of Non-Destructive Testing (NDT) in Quality | 12 | 1,3,8 | A,B |
| **2** | Introduction to Visual Inspection | 1,2,4,5 | 1,3,8 | A,B |
| **3** | Introduction to Radiographic Testing | 1,2,4,5 | 1,3,8 | A,B |
| **4** | Introduction to Ultrasonic Testing | 1,2,4,5 | 1,3,8 | A,B |
| **5** | Introduction to Penetrant Testing | 1,2,4,5 | 1,3,8 | A,B |
| **6** | Introduction to Magnetic Particle Testing | 1,2,4,5 | 1,3,8 | A,B |
| **7** | Other Non-Destructive Testing Methods | 4,12 | 1,3,8 | A,B |
| **8** |  |  |  |  |

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| **Main Textbook** | Tahribatsız Muayene, Ahmet TOPUZ, 1993, YTÜ Yayınları |
| **Supporting References** |  |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | Definition of Non-Destructive Testing (NDT) |
| **2** | Visual Inspection (VT) |
| **3** | Magnetic Particle Testing (MT) |
| **4** | Magnetic Particle Testing (MT) |
| **5** | Liquid Penetrant Testing (PT) |
| **6** | Liquid Penetrant Testing (PT) |
| **7** | Eddy Current Testing (ET) |
| **8** | Mid-Term Exam |
| **9** | Ultrasonic Testing (UT) |
| **10** | Ultrasonic Testing (UT) |
| **11** | Radiographic Testing (RT) |
| **12** | Radiographic Testing (RT) |
| **13** | Other Testing Methods |
| **14** | Production-Related Defects |
| **15** | Operation-Related Defects |
| **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 | 1 | 2 |
| 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) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1 | 1 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 25 | 25 |
|  | **Total workload** | | **136** |
|  | **Total workload / 30** | | **4.53** |
|  | **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 2 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 1 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 5 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Dr.  Reşat Can ÖZDEN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Welding Technology and Metallurgy |  |

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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** |
|  | ✓ |  |  |  |

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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 to learn about welding and other joint methods, to select joint methods based on their intended application, to acquire knowledge about new welding and joint techniques, and to understand the relationship between weld defects and materials |
| **Short Course Content** | Technical drawing terminology, drawing tools, freehand drawing, perspective views, basic and auxiliary views, dimensioning, sectioning, drawing reading |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understanding the basic principles of welding as a manufacturing process, | 2,3 | 1,10 | A,E,K |
| **2** | Understanding the application principles of welding methods, | 2,3 | 1,10,15 | A,E,K |
| **3** | Determination of welding method suitable for part shape and its material | 2,3,12 | 1,2,8 | A,E,G,K |
| **4** | Understanding and preventing weld defects | 2,3,12 | 1,2,7,8 | A,E,K |
| **5** | Interpretation of micro structure changes that occur during welding, | 2,3,12 | 1,2 | A,E,K |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| **Main Textbook** | Kou, Sindo,. (2003). Welding Metallurgy, 2nd Edition, A John Wiley & Sons Inc. Publication |
| **Supporting References** | 1. AWS Welding Handbook, VOL-1 - 9th Ed (2001)- Welding Science and Technology 2. AWS Welding Handbook, VOL-2 - 9th Ed (2004) - Welding Processes, Part 1 3. AWS Welding Handbook, VOL-3 - 9th Ed (2007) - Welding Processes, Part 2 |
| **Necessary Course Material** | Computer and Projector |

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| **Course Schedule** | |
| **1** | Introduction and General Description of Welding |
| **2** | Joining Techniques |
| **3** | Welding Methods by Fusion: Gas Welding |
| **4** | Arc Welding Methods: Plasma Arc, Submerged Arc, Gas Shielded Arc, Flux Cored |
| **5** | Electron Beam Welding, Laser Beam Welding, Electroslag Welding |
| **6** | Heat Flow and Efficiency of Melting |
| **7** | Chemical Reactions in the welding process |
| **8** | Mid-Term Exam |
| **9** | Weld Defects |
| **10** | Stress and Distortion in Welded Joints |
| **11** | Weld Plan and Weld Sequence Plan |
| **12** | Destructive and Non-Destructive Tests Used Determine of Weld Quality |
| **13** | Solid State Weld Methods |
| **14** | Brazing and Soldering |
| **15** | Student Presentations |
| **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 |
| Article Criticism | 8 | 2 | 16 |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Presentation (Preparation time included) | 1 | 4 | 4 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  | **Total workload** | | **138** |
|  | **Total workload / 30** | | **4,6** |
|  | **Course ECTS Credit** | | **5** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
|  |  |
|  |  |
| **Final Exam** | 45 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 3 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Kerem AYBAR, Ph.D. |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Biomaterials |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 | 0 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| ✓ | ✓ | ✓ |  |  |

|  |  |  |
| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | To gain knowledge the biomaterials used in the human body and their properties, to examine the application areas of biomaterials, and to have an idea about the ongoing biomaterial studies in the world. |
| **Short Course Content** | Classification of biomaterials, properties of biomaterials, production of biomaterials, characterization of biomaterials, application examples of biomaterials. |

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| --- | --- | --- | --- | --- |
| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Acquiring comprehensive knowledge on issues related to the definition, classification and production of biomaterials | 1, 4, 8, 11 | 1, 2, 5, 8 | A, E, K |
| **2** | Gaining knowledge about defining biocompatibility and testing methods | 1, 4, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **3** | Learning the properties, production techniques and principles of use of metallic-based biomaterials | 1, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **4** | Learning the properties, production techniques and principles of use of ceramic-based biomaterials | 1, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **5** | Learning the properties, production techniques and principles of use of polymeric-based and composite biomaterials | 1, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |
| **6** | Acquiring knowledge on topics related to new generation biomaterials, 3-dimensional bioprinting, organ-on-chip | 1, 3, 4, 6, 7, 8, 11, 12, 13 | 1, 2, 5, 8, 12, 15 | A, E, G, K |

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| **Main Textbook** | Park, J. B. (2012). Biomaterials science and engineering. Springer Science & Business Media. |
| **Supporting References** | 1. Park, J., & Lakes, R. S. (2007). Biomaterials: an introduction. Springer Science & Business Media 2. Avci H. Polimerler: Özellikleri ve Uygulamaları, ESOGU Yayınevi. 2021. |
| **Necessary Course Material** | Computer and projection. |

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| **Course Schedule** | |
| **1** | Introduction |
| **2** | Biocompatibility |
| **3** | Classification of biomaterials |
| **4** | Properties of biomaterials |
| **5** | Production techniques of biomaterials. |
| **6** | Metallic biomaterials: Stainless steel, cobalt-chromium (Co-Cr) alloys |
| **7** | Metallic biomaterials: Titanium and titanium alloys |
| **8** | Mid-Term Exam |
| **9** | Ceramic biomaterials: Alumina and zirconia |
| **10** | Ceramic biomaterials: Calcium phosphate-based ceramics |
| **11** | Polymer materials: Hard tissues |
| **12** | Polymer materials: Soft tissues |
| **13** | Biocomposites |
| **14** | New generation biomaterials |
| **15** | Presentations |
| **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 |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 12 | 12 |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) | 1 | 4 | 4 |
| Article examination | 8 | 2 | 16 |
|  |  |  |  |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  | **Total workload** | | **138** |
|  | **Total workload / 30** | | **4,6** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| **Final Exam** | 45 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 5 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 4 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Hüseyin Avcı |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| NANOMATERIALS |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 |  | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
| √ | √ |  |  |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

|  |  |
| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | Understanding the synthesis methods of nanomaterials, characteristics and structure relationships, learning the application areas of nanomaterials |
| **Short Course Content** | 1. Ability to identify differences between materials and nanomaterials 2. Ability to synthesize the nanomaterials 3. Ability to identify a relation between characteristics and the nanomaterial properties. Designing synthesis method depend on applications |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Ability to identify differences between materials and nanomaterials | 1,4 | 1,2,5 | A,E,F,G |
| **2** | Ability to synthesize the nanomaterials | 1,4 | 1,2,5 | A,E,F,G |
| **3** | Ability to identify a relation between characteristics and the nanomaterial properties. | 1,4 | 1,2,5 | A,E,F,G |
| **4** | Designing synthesis method depend on applications | 1,4 | 1,2,5 | A,E,F,G |
| **5** | Defines the differences between macro- and nanomaterials | 1,4 | 1,2,5 | A,E,F,G |
| **6** | Analyzes the relationships between structure and properties. | 1,4 | 1,2,5 | A,E,F,G |
| **7** | Designs synthesis method depend on applications. | 1,4 | 1,2,5 | A,E,F,G |
| **8** |  |  |  |  |

|  |  |
| --- | --- |
| **Main Textbook** | C. C. Koch, Nanostructured Materials, Noyes, 2002. |
| **Supporting References** | A.K. Bandyopadhyay, Nanomaterials, New Age, 2008. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Chemical Synthesis |
| **2** | Thermal Spray Methods |
| **3** | Solid State Synthesis |
| **4** | Consolidations of nanomaterials |
| **5** | Electrodeposition |
| **6** | Diffusion in nanomaterials |
| **7** | Solid-gas reactions |
| **8** | Mid-Term Examination |
| **9** | Mid-Term Examination |
| **10** | Mechanical properties of nanomaterials |
| **11** | Electronical properties of nanomaterials |
| **12** | Magnetic properties of nanomaterials |
| **13** | Application examples |
| **14** | Application examples |
| **15** | 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 |
| Report Preparation | 8 | 3 | 24 |
| Report Presentation | 2 | 4 | 8 |
| 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) |  |  |  |
| Crtics of publications | 8 | 2 | 16 |
| Mid-Term Exam | 1 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 8 | 8 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 10 | 10 |
|  |  |  |  |
|  | **Total workload** | | **140** |
|  | **Total workload / 30** | | **4,666** |
|  | **Course ECTS Credit** | | **5** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 35 |
| Report | 10 |
| Presentation | 10 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 45 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 2 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 1 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 2 |
| **9** | Awareness of professional and ethical responsibility. | 1 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assist.Prof.Dr. Şahin Coşkun |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Electrical, Optical and Magnetic Properties of Materials |  |

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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** |
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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** | Explaining the electrical, optical and magnetic properties of materials from their physical properties. |
| **Short Course Content** | Introduction of electrical, optical and magnetic properties and application areas of the material. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Learning ways to reach the desired scientific knowledge. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |
| **2** | Writing a report in accordance with the rules and presentation information. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |
| **3** | Necessary to increase the ability to use computer programs. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |
| **4** | To gain experience in oral questions and answers and presentation. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |
| **5** | Understanding and recognition of professional and ethical responsibility. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |
| **6** | Engineering research, the ability to understand the national and global influence. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |
| **7** | Understand the importance of lifelong learning and practice skills. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |
| **8** | Monitoring current issues in vocational skills. | 1, 2, 4, 8 | 1, 2, 5, 8, 15 | A, D, G |

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| --- | --- |
| **Main Textbook** | Shackelford, J.,F., İntroduction to Materials Science for Engineers, 5th Edition, Prentice Hall, New Jersey, 2000 |
| **Supporting References** | Solymar, L., Walsh, D., Lectures on the electrical properties of materials, Oxford Science Publications, 4th Edition, New York, 1990 |
| **Necessary Course Material** |  |

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| --- | --- |
| **Course Schedule** | |
| **1** | explanation about text and subjects |
| **2** | Charge Carriers and Conduction |
| **3** | Energy levels and Energy bands |
| **4** | Conductors, superconductors,insulators, composites |
| **5** | Ferroelectrics, Piezoelectrics, semiconductors |
| **6** | Ödev Sunumu |
| **7** | Optical properties, Refractive Index, Snell's Law, Fresnel's Law |
| **8** | Mid-Term Exam |
| **9** | Optical properties and devices, liquid crystal displayers, Photoconductors |
| **10** | Magnetic properties of materials, magnetism |
| **11** | Ferromagnetism |
| **12** | Ödev Sunumu |
| **13** | Metalic magnetics, soft magnets |
| **14** | Superconductor magnets, ceramic magnets |
| **15** | Superconductor magnets, ceramic magnets |
| **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) | 2 | 30 | 60 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **152** |
|  | **Total workload / 30** | | **5.06** |
|  | **Course ECTS Credit** | | **5** |

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| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Project Observation | 30 |
| Presentation | 30 |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| Bir öğe seçin. |  |
| **Final Exam** | 40 |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 5 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 3 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 3 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 1 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 1 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. M. Celalettin BAYKUL |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Occupational Health And Safety II |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | | | **ECTS** | |
| **Theory** | **Practice** | | |
| 8 | 2 | 0 | | | 2 | |
| **Course Category (Credit)** | | | | | | |
| **Basic Sciences** | **Engineering Sciences** | | **Design** | **General Education** | | **Social** |
|  |  | |  | √ | |  |

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| --- | --- | --- |
| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** |  |
| **Objectives of the Course** | The course aims to teach the principles of occupational health and safety specifically within the defined regulations and legal framework of the iron and steel industry. |
| **Short Course Content** | Occupational health and safety legislation and legal framework, hazard identification and risk analysis methods, worker health and safety in the iron and steel industry, foundries and workshops, emergencies, ethics in the workplace. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | The student will be able to interpret and apply the basic principles of occupational health and safety legislation, as well as specific regulations for the iron and steel industry, understanding and implementing legal requirements in this field. | 9, 11 | 1 | A, G |
| **2** | The student will identify potential hazards in foundries and workshops, conduct risk assessments using appropriate methods, and determine necessary preventive measures. | 9, 11 | 1 | A, G |
| **3** | The student will evaluate the specific occupational health and safety requirements in the iron and steel industry, assessing potential risks faced by workers and evaluating protective measures against these risks. | 9, 11 | 1 | A, G |
| **4** | The student will comprehend the processes of developing and implementing emergency plans, evaluating and improving occupational health and safety practices within the framework of workplace ethics. | 9, 11 | 1 | A, G |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |

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| --- | --- |
| **Main Textbook** | 1. Kahya, E., 2022, **İş Güvenliği**, ESOGÜ Yayın No :246, Eskişehir. 2. 6331 Sayılı İş Sağlığı ve Güvenliği Kanunu |
| **Supporting References** | 1. Yiğit, A., **İş Güvenliği**, 2013, Dora basım-Yayın Dağıtım Ltd. Şti, Bursa  2. Bayır, M. ve Ergül, M., 2006, **İş Güvenliği ve Risk Değerlendirme Uygulamaları**, Bursa.  3. Dizdar, E.N., 2008, İş Güvenliği, 4.Baskı, Murathan Yayınevi, Trabzon.  4. Esin, A., 2006, Yeni Mevzuatın Işığında İş Sağlığı ve Güvenliği, TMMO MMO Yayın No:MMO/363/2, Ankara. |
| **Necessary Course Material** | Computer, projection equipment, personal safety equipment |

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| **Course Schedule** | |
| **1** | Occupational Health and Safety Legislation and Legal Framework |
| **2** | Occupational Health and Safety Legislation and Legal Framework |
| **3** | Hazard and Risk Identification |
| **4** | Risk Analysis Methods |
| **5** | Risk Analysis Methods |
| **6** | Personal Protective Equipment |
| **7** | Personal Protective Equipment |
| **8** | Mid-Term Exam |
| **9** | Worker Health and Safety in the Iron and Steel Industry |
| **10** | Worker Health and Safety in the Iron and Steel Industry |
| **11** | Worker Health and Safety in Foundries |
| **12** | Worker Health and Safety in Workshops (Turning - Milling) |
| **13** | Emergencies |
| **14** | Emergencies |
| **15** | Ethics in the Workplace |
| **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 | 2 | 28 |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| 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) | 1 | 10 | 10 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam | 1 | 1 | 1 |
| Studying for Mid-Term Exam | 1 | 10 | 10 |
| Final Exam | 1 | 1 | 1 |
| Studying for Final Exam | 1 | 15 | 15 |
|  | **Total workload** | | **65** |
|  | **Total workload / 30** | | **2,16** |
|  | **Course ECTS Credit** | | **2** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 20 |
| Homework |  |
|  |  |
| **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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 2 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 1 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 1 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 1 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 2 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 5 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 2 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 5 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 2 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Hakan GAŞAN |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Corrosion |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| SPRING | 3 | 0 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
|  | **** |  |  |  |

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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequisite(s) if any** | 151914206 Metallurgical Thermodynamics II |
| **Objectives of the Course** | To teach the basic principles of corrosion, to teach the types of corrosion and countermeasures to be taken, to have knowledge about material selection and design to prevent corrosion. |
| **Short Course Content** | Electrochemical thermodynamics, electrochemical kinetics, passivation, galvanic corrosion, local corrosion types, environmental factors on corrosion, erosion corrosion, concrete corrosion, biological corrosion, atmospheric corrosion, effect of metallurgical factors on corrosion, cathodic protection, inhibitors. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Understanding the principles of electrochemical interaction  between materials and the environment | 1 | 1 | A |
| **2** | To be able to define the types of corrosion that can be  observed due to material-environment interaction | 2 | 1 | A |
| **3** | Selecting materials suitable for current environmental  conditions | 3 | 8 | B |
| **4** | |  |  |  |
| **5** | |  |  |  |
| **6** | |  |  |  |
| **7** | |  |  |  |
| **8** | |  |  |  |

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| --- | --- |
| **Main Textbook** | D. A. Jones, Principles and Prevention of Corrosion, , Prentice Hall, NJ, 1996. |
| **Supporting References** | S. Üneri, Korozyon ve Önlenmesi, Korozyon Derneği Yayını, Ankara, 1998.  H. H. Uhlig, Corrosion and Corrosion Control, John Wiley, New York, 1963. |
| **Necessary Course Material** |  |

|  |  |
| --- | --- |
| **Course Schedule** | |
| **1** | Electrochemical Thermodynamics - Introduction |
| **2** | Electrochemical Thermodynamics – Nernst Equation and Its Uses |
| **3** | Electrochemical Thermodynamics – Potential – pH Diagrams |
| **4** | Electrochemical Kinetics - Polarization |
| **5** | Electrochemical Kinetics – Mixed Potential Theory |
| **6** | Passivation |
| **7** | Galvanic Corrosion |
| **8** | Mid-Term Exam |
| **9** | Local Corrosions |
| **10** | Environment Assisted Failures |
| **11** | Erosion, Cavitation, Concrete Corrosions |
| **12** | Biological, Atmospheric, High Temperature, Sulfurization Corrosions |
| **13** | Filiform, Exfoliation, Dezincification, Graphite Corrosions |
| **14** | Metallurgical Factors, Intergranular, Weld Corrosions |
| **15** | Cathodic Protections |
| **16,17** | Final Exam |

|  |  |  |  |
| --- | --- | --- | --- |
| **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,….) |  |  |  |
| Homework |  |  |  |
| Quiz Exam | 2 | 1 | 2 |
| Studying for Quiz Exam | 2 | 5 | 10 |
| 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 | 2 | 2 |
| Studying for Mid-Term Exam | 1 | 15 | 15 |
| Final Exam | 1 | 2 | 2 |
| Studying for Final Exam | 1 | 20 | 20 |
|  | **Total workload** | | **93** |
| **Total workload / 30** | | **3.1** |
| **Course ECTS Credit** | | **3** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 30 |
| Quiz | 20 |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems | 4 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods | 4 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology | 2 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems | 3 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams | 2 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at  least one foreign language | 2 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself | 2 |
| **9** | Awareness of professional and ethical responsibility | 2 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development | 1 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control | 3 |
| **13** | The ability to confidently approach problems encountered in engineering applications | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Mustafa ANIK |  |  |  |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| METALLURGICAL AND MATERIALS ENGINEERING  THESIS PROJECT | 151918561 |

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| --- | --- | --- | --- |
| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 5 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Elective |

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| **Prerequisite(s) if any** | METALLURGICAL AND MATERIALS ENGINEERING PROJECT PREPARATION |
| **Objectives of the Course** | This course aims to equip senior students of the Metallurgical and Materials Engineering department with the necessary competencies to prepare and present their graduation theses. Students will gain skills in conducting research, data collection and analysis, thesis writing,  and presentation. Additionally, this course provides a solid foundation for their academic and professional careers. |
| **Short Course Content** | This course teaches Metallurgical and Materials Engineering students all stages of their graduation thesis. Students gain competencies in conducting research, data collection and analysis, thesis writing, and presentation. Additionally, they develop skills in project management, time management, and reporting. |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Students learn the stages of planning, implementing, and  evaluating their graduation theses. | 2,4,5,6 | 14 | C,D |
| **2** | They gain competence in conducting research, data  collection, and analysis. | 2,5,6 | 1,3,10 | C,D |
| **3** | They develop skills in thesis writing, presentation, and  reporting. | 7 | 11,12,15 | C,D |
| **4** | They strengthen their teamwork, communication, and task distribution skills. | 2,5,6 | 12 | C,D |
| **5** | |  |  |  |
| **6** | |  |  |  |
| **7** | |  |  |  |
| **8** | |  |  |  |

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| **Main Textbook** |  |
| **Supporting References** |  |
| **Necessary Course Material** |  |

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| **Course Schedule** | |
| **1** | Introduction and Course Overview |
| **2** | Determination of Research Topic |
| **3** | Determination of Research Topic |
| **4** | Literature Review and Source Research |
| **5** | Literature Review and Source Research |
| **6** | Literature Review and Source Research |
| **7** | Writing of Introduction and Literature Sections |
| **8** | Mid-Term Exam |
| **9** | Experiments |
| **10** | Experiments |
| **11** | Experiments |
| **12** | Experiments |
| **13** | Writing of Methodology and Findings Sections |
| **14** | Writing of Discussion and Conclusion Sections |
| **15** | Thesis Presentation and Evaluation |
| **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 | 5 | 70 |
| Classroom Studying Time (review, reinforcing, prestudy,….) |  |  |  |
| Homework | 2 | 20 | 40 |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam | 1 | 1 | 1 |
| Studying for Oral Exam | 1 | 20 | 20 |
| Report (Preparation and presentation time included) |  |  |  |
| Project (Preparation and presentation time included) |  |  |  |
| Presentation (Preparation time included) | 1 | 30 | 30 |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam |  |  |  |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **161** |
| **Total workload / 30** | | **5,36** |
| **Course ECTS Credit** | | **5** |

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| **Evaluation** | |
| **Activity Type** | **%** |
| Oral Exam | 40 |
| Homework | 5 |
| Homework | 5 |
|  |  |
| **Final Exam** |  |
| Presentation | 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 3 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 5 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 4 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 5 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 3 |
| **9** | Awareness of professional and ethical responsibility. | 3 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 3 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 1 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 2 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 3 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Prof. Dr. Mustafa ANIK | Prof. Dr. Hakan GAŞAN | Dr. Öğr. Üyesi Ersu LÖKÇÜ | Dr. Öğr. Üyesi R.Can ÖZDEN |
| **Signature(s)** |  |  |  |  |

**ESOGU METALLURGICAL AND MATERIALS ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Entrepreneurship |  |

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| **Semester** | **Number of Course Hours per Week** | | **ECTS** |
| **Theory** | **Practice** |
| 7 | 2 | 0 | 2 |

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| **Course Category (Credit)** | | | | |
| **Basic Sciences** | **Engineering Sciences** | **Design** | **General Education** | **Social** |
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| **Course Language** | **Course Level** | **Course Type** |
| Turkish | Undergraduate | Compulsory |

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| **Prerequisite(s) if any** | - |
| **Objectives of the Course** | Learning the basics of entrepreneurship and the roadmap for establishing a successful company. |
| **Short Course Content** | Entrepreneurship, Preparing of Investment projects, Project management, Marketing plan, Technical analysis (Facility layout, Production Planning, Management plan), Financial Planning, Writing and presentation of Business plans, Risk management, Aided programs |

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| **Learning Outcomes of the Course** | | **Contributed PO(s)** | **Teaching Methods \*** | **Measuring Methods \*\*** |
| **1** | Ability to define basic concepts related with entrepreneurship | 1,2,5 | 1,4,5,8 | A,B,D,E,G,J,K |
| **2** | Knowing project management for investment | 1,2,3,4,5,10 | 1,4,5,8 | A,B,D,E,G,J,K |
| **3** | Prepare marketing plan | 4,5 | 1,4,5,8 | A,B,D,E,G,J,K |
| **4** | Prepare Technical analysis | 2,3,6,10 | 1,4,5,8 | A,B,D,E,G,J,K |
| **5** | Prepare financial plan | 6,7,10,11,12,13 | 1,4,5,8 | A,B,D,E,G,J,K |
| **6** | Writing and presentation of Business plans | 3,4,5,6,7,8,13 | 1,4,5,8 | A,B,D,E,G,J,K |
| **7** | Knowing risk components in a project | 3,4,5,6,7,8,10,11,12,13 | 1,4,5,8 | A,B,D,E,G,J,K |
| **8** | Knowing aided programs. | 3,4,5,6,7,8 | 1,4,5,8 | A,B,D,E,G,J,K |

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| **Main Textbook** | Kahya, E., 2013, Yatırım Analizi, ESOGÜ MMF Endüstri Müh. Bölümü, Eskişehir. Başar, M., Ürper, Y., Tosunoğlu, B.T., 2013, Girişimcilik, A.Ü. Yayın No:3002, AÖF Yayın No:3002, Eskişehir. |
| **Supporting References** |  |
| **Necessary Course Material** | Reading, comprehension and presentations |

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| **Course Schedule** | |
| **1** | Information about course scope, execution, evaluation |
| **2** | Entrepreneurship |
| **3** | Preparing of Investment projects |
| **4** | Project management |
| **5** | Marketing plan |
| **6** | Marketing plan |
| **7** | Technical analysis – Facility layout |
| **8** | Mid-Term Exam |
| **9** | Production Planning |
| **10** | Management plan |
| **11** | Financial Planning |
| **12** | Writing and presentation of Business plans |
| **13** | Risk management |
| **14** | Aided programs |
| **15** | Aided programs |
| **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 | 2 | 28 |
| Classroom Studying Time (review, reinforcing, prestudy,….) | 14 | 2 | 28 |
| Homework | 1 | 4 | 4 |
| Quiz Exam |  |  |  |
| Studying for Quiz Exam |  |  |  |
| Oral exam |  |  |  |
| Studying for Oral Exam |  |  |  |
| Report (Preparation and presentation time included) | 1 | 10 | 10 |
| Project (Preparation and presentation time included) | 1 | 2 | 2 |
| Presentation (Preparation time included) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Mid-Term Exam |  |  |  |
| Studying for Mid-Term Exam |  |  |  |
| Final Exam |  |  |  |
| Studying for Final Exam |  |  |  |
|  | **Total workload** | | **72** |
|  | **Total workload / 30** | | **2.4** |
|  | **Course ECTS Credit** | | **2** |

|  |  |
| --- | --- |
| **Evaluation** | |
| **Activity Type** | **%** |
| Mid-term | 40 |
| Quiz |  |
| Presentation |  |
| Bir öğe seçin. |  |
| 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** | To possess sufficient knowledge in mathematics, science, and engineering subjects related to Metallurgical and Materials Engineering; the ability to apply theoretical and practical knowledge in these areas to model and solve engineering problems. | 1 |
| **2** | The ability to identify, define, formulate, and solve complex engineering problems by selecting and applying appropriate analysis and modeling methods. | 4 |
| **3** | The ability to design a complex system, process, device, or product under realistic constraints and conditions to meet specific requirements by applying modern design methods. | 3 |
| **4** | The ability to develop, select, and use modern techniques and tools necessary for engineering applications encountered as a Metallurgical and Materials Engineer; the ability to effectively use information technology. | 3 |
| **5** | The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of engineering problems. | 4 |
| **6** | The ability to work effectively individually, as well as within disciplinary and interdisciplinary teams. | 5 |
| **7** | The ability to communicate effectively in Turkish, both verbally and in writing; knowledge of at least one foreign language. | 4 |
| **8** | The awareness of the necessity for lifelong learning; the ability to access information, follow developments in science and technology, and continuously renew oneself. | 4 |
| **9** | Awareness of professional and ethical responsibility. | 4 |
| **10** | Knowledge about business practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development. | 5 |
| **11** | Knowledge about the universal and societal impacts of engineering applications on health, environment, and safety; awareness of the legal consequences of engineering solutions. | 4 |
| **12** | Awareness of quality consciousness and sustainability in material selection, product development, and production processes in engineering applications; awareness of quality control. | 4 |
| **13** | The ability to confidently approach problems encountered in engineering applications. | 4 |

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| **LECTUTER(S)** | | | | |
| **Prepared by** | Assoc. Prof. Dr. Bedri BAKSAN |  |  |  |
| **Signature(s)** |  |  |  |  |