|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **1st Year** | | | | | | |
| Code | Course Name | | ECTS | T+P+L | C/E | Language |
| Fall | | | | | | |
| 151611204 | [Chemistry I](#Chemistry_1) | 6 | | 4-0-0 | C | Turkish |
| 151611132 | [Introduction to Chemical Engineering](#Introduction_To_Chemical_Engineering) | 3 | | 2-0-0 | C | Turkish |
| 151611181 | [Turkish Language I](#turkish_lngu_1) | 2 | | 2-0-0 | C | Turkish |
| 151611195 | [Physics I](#physic_1) | 3 | | 3-0-0 | C | Turkish |
| 151611196 | [Physics Laboratory I](#fizik_lab_111111) | 2 | | 0-0-2 | C | Turkish |
| 151611203 | [Calculus I](#calculuss_1) | 5 | | 4-0-0 | C | Turkish |
| 151011209 | [English I](#english_1) | 3 | | 3-0-0 | C | English |
| 151611205 | [Information Technology](#inf_techno) | 2 | | 2-0-0 | C | Turkish |
| 151611206 | [Report Writing Techniques](#Report_Writing_Technique) | 3 | | 2-0-0 | C | Turkish |
| 151611185 | Seminar I (for foreign students) | - | | 2-0-0 | C | Turkish |
| 151011210 | Turkish Language I (for foreign students) |  | |  |  | Turkish |
| Total of Fall Semester: | | 29 | |  |  |  |
| Spring | | | | | | |
| 151612182 | [Turkish Language II](#turk_dil_2) | 2 | | 2-0-0 | C | Turkish |
| [151612](http://ects.ogu.edu.tr/ects/dersler.aspx?ID=3376)208 | [Chemistry II](#chemistry_2) | 6 | | 4-0-0 | C | Turkish |
| [151612](http://ects.ogu.edu.tr/ects/dersler.aspx?ID=2661)188 | [Chemistry Laboratory](#chemical_lab) | 2 | | 0-0-2 | C | Turkish |
| 151612198 | [Engineering Drawing](#Eng_Drawing) | 4 | | 2-2-0 | C | Turkish |
| 151612200 | [Physcics II](#physics_2) | 3 | | 3-0-0 | C | Turkish |
| 151612201 | [Physics Laboratory II](#fizik_lab_22) | 2 | | 0-0-2 | C | Turkish |
| 151612207 | [Calculus II](#calculus_2) | 5 | | 4-0-0 | C | Turkish |
| 151012210 | [Englisch II](#eng_2) | 3 | | 3-0-0 | C | English |
| 151612204 | [Basic Computer Science](#basic_computer) | 4 | | 2-2-0 | C | Turkish |
| 151612186 | Seminar II (for foreign students) | - | | 2-0-0 | C | Turkish |
| 151012211 | Turkish Language II (for foreign students) |  | |  |  |  |
| Total of Spring Semester : | | 31 | |  |  |  |
| TOTAL : | | 60 | |  |  |  |

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| **2nd Year** | | | | | | |
| Code | Course Name | | ECTS | T+P+L | C/E | Language |
| Fall | | | | | | |
| 151613246 | [Differential Equations](#Dif_Equ) | 4 | | 2-2-0 | C | Turkish |
| 151011208 | [History of Turkish Revolution and Principles of Kemal Atatürk I](#His_of_Turkish_Rev_and_KemalAtatürk_I) | 2 | | 2-0-0 | C | Turkish |
| 151613553 | [Physical Chemistry](#physica_Chemistry) | 4 | | 3-0-0 | C | Turkish |
| 151613563 | [Physical Chemistry Laboratory](#Physical_Chemistry_Lab) | 4 | | 0-0-2 | C | Turkish |
| 151613555 | [Analytical Chemistry](#analytical_chem) | 4 | | 3-0-0 | C | Turkish |
| 151613556 | [Chemical Process Calculations](#Chemical_Proces_Calculation) | 6 | | 4-0-0 | C | Turkish |
| 151613564 | [Occupational Health and Safety I](#Occupational_1) | 3 | | 2-0-0 | C | Turkish |
| 151613558 | [Business and Entrepreneurship](#Busines_ntrepreneurship) | 3 | | 2-0-0 | C | Turkish |
| 151013211 | History of Turkish Revolution and Principles of Kemal Atatürk I (for foreign students) |  | |  |  |  |
| Total of Fall Semester : | | 30 | |  |  |  |
| Spring | | | | | | |
| 151614555 | [Organic Chemistry](#Organic_Che) | 4 | | 3-0-0 | C | Turkish |
| 151614240 | [Numerical Methods in Engineering](#Num_Met_in_Engin) | 4 | | 3-0-0 | C | Turkish |
| 151012209 | [History of Turkish Revolution and Principles of Kemal Atatürk II](#His_of_Turkish_Rev_and_KemalAtatürk_II) | 2 | | 2-0-0 | C | Turkish |
| 151614553 | [Analytical Chemistry Laboratory](#Analytical_Chemistry_Laboratory) | 4 | | 0-0-4 | C | Turkish |
| 151614554 | [Thermodynamics I](#Thermodynamics_1) | 4 | | 3-0-0 | C | Turkish |
| 151614556 | [Fluids Mechanics](#Fluid_Mech) | 6 | | 4-0-0 | C | Turkish |
| 151614560 | [Occupational Health and Safety II](#Occupational_2) | 3 | | 2-0-0 | C | Turkish |
| 151614558 | [Quality Management](#Quality_Mana) | 3 | | 2-0-0 | C | Turkish |
| Total of Spring Semester : | | 30 | |  |  |  |
| TOTAL : | | 60 | |  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **3rd Year** | | | | | |
| Code | Course Name | ECTS | T+P+L | C/E | Language |
| Fall | | | | | |
| 151615419 | [Engineering Economics](#engineering_econ) | 5 | 3-0-0 | C | English |
| 151615417 | [Professional English I](#Professional_English_I) | 3 | 2-0-0 | C | English |
| 151615401 | [Thermodynamics II](#Thermodynamics_2) | 5 | 3-0-0 | C | Turkish |
| 151615402 | [Heat Transfer](#heat_transfer) | 5 | 3-0-0 | C | Turkish |
| 151615403 | [Mass Transfer](#Mass_Trans) | 5 | 3-0-0 | C | Turkish |
| 151615404 | [Instrumental Analysis](#Ins_Analy) | 3 | 2-0-0 | C | Turkish |
| 151615405 | [Instrumental Analysis Laboratory](#Ins_Analy_Lab) | 2 | 0-0-2 | C | Turkish |
|  | SOCIAL ELECTIVE I | 2 | 2-0-0 | E | Turkish |
| 151615408 | [German I](#german_1) |  |  |  |  |
| 151615409 | [English Written Communication](#Eng_Writ_Comm) |  |  |  |  |
| 151615415 | [Society And Gender](#society_gender) |  |  |  |  |
| 151615414 | [Introductıon To Culturel Anthropology](#antropology) |  |  |  |  |
| 151615418 | [Labor Legistation](#labor_legistation) |  |  |  |  |
| Total of Fall Semester : | | 30 |  |  |  |
| Spring | | | | | |
| 151616373 | [Chemical Reaction Engineering I](#chemcical_reaction_eng_1) | 4 | 3-0-0 | C | Turkish |
| 151616374 | [Separation Operation](#sep_oper) | 6 | 3-2-0 | C | Turkish |
| 151616375 | [Professional English II](#prof_eng_2) | 3 | 2-0-0 | C | English |
| 15161672 | [Engineering Materials](#eng_materials) | 3 | 2-0-0 | C | Turkish |
| 151616355 | [Mathematical Modeling in Chemical Engineering](#Mathematical_Modeling_chemica_eng) | 5 | 3-0-0 | C | Turkish |
| 151616356 | [Chemical Engineering Laboratory I](#Che_Engin_Lab_I) | 3 | 0-0-2 | C | Turkish |
|  | TECHNICAL ELECTIVE I | 4 | 3-0-0 | E | Turkish |
| 151615394 | [Electrochemistry](#electrochemistry) |  |  |  |  |
| 151616360 | [Workspace Risk Analysis](#Workplace_Risk) |  |  |  |  |
| 151616361 | [Green and Sustainable Chemistry and Eng.](#GaSCa_Engin) |  |  |  |  |
| 151616378 | [Polymer Chemistry](#Polyme_Chemistry) |  |  |  |  |
| 151616379 | [Introduction to Energy Technologies](#Introdu_energy_tech) |  |  |  |  |
| 151616380 | [Petroleum Refining and Petrochemical Technology](#Petroleum_ref) |  |  |  |  |
| 151616381 | [Hydrogen Energy and Fuel Cells](#Hyd_En_And_Fuel_Cells) |  |  |  |  |
| 151616362 | [Water Technology](#Water_Tech) |  |  |  |  |
| 151616376 | [Engineering mechanics](#eng_mechannics) |  |  |  |  |
| 151616377 | [Statistics](#staticts) |  |  |  |  |
|  | SOCIAL ELECTIVE II | 2 | 2-0-0 | E | Turkish |
| 151616364 | [German II](#german_2) |  |  |  |  |
| 151616365 | [English Oral Communication](#Eng_Oral_Comm) |  |  |  |  |
| 151616366 | [Interpersonal Communication](#ınterpersonal) |  |  |  |  |
| 151616368 | [Intellectual & Industrial Property Rights](#intellectual_ındustrial) |  |  |  |  |
| Total of Spring Semester : | | 30 |  |  |  |
| TOTAL : | | 60 |  |  |  |
| **4th Year** | | | | | |
| Code | Course Name | ECTS | T+P+L | C/E | Language |
| Fall | | | | | |
| 151617652 | [Chemical Reaction Engineering II](#chemical_reaction_eng_2) | 4 | 3-0-0 | C | Turkish |
| 151617427 | [Chemical Engineering Laboratory II](#chemical_eng_lab_2) | 5 | 0-0-4 | C | Turkish |
| 151617653 | [Preparation for Engineering Researches](#Pro_for_eng_research) | 3 | 2-0-0 | C | Turkish |
| 151617635 | [Design in Chemical Engineering I](#design_in_chemical_1) | 6 | 3-2-0 | C | Turkish |
| 151617637 | [Process Control](#process_control) | 5 | 4-0-0 | C | Turkish |
| 151617654 | [Computer Applications in Chemical Engineering](#coomputer_applications_in_chemical_engin) | 3 | 1-2-0 | C | Turkish |
|  | TECHNICAL ELECTIVE II | 4 | 3-0-0 | E | Turkish |
| 151617640 | [Fuel Technology](#fuel_techhhhh) |  |  |  |  |
| 151617641 | [Surface Chemistry](#surfaceee) |  |  |  |  |
| 151617642 | [Industrial Electrochemistry](#industrial_elecc) |  |  |  |  |
| 151617643 | [Boron Technology](#BORRRRR) |  |  |  |  |
| 151617644 | [Ion Exchange Technology](#ionnn_exchangee) |  |  |  |  |
| 151617645 | [Composite and Biomaterials](#COMPOSİTE_BİO) |  |  |  |  |
| 151617646 | [Technical Polymers](#TEKNİK_polymer) |  |  |  |  |
| 151617647 | [Extraction Technology](#EXTRACTİON) |  |  |  |  |
| 151617655 | [Experimental Design in Chemical Engineering](#EXPERİMENTAL_DESİGN) |  |  |  |  |
| 151617660 | [Introduction to Nanotechnology](#Intro_Nanotech) |  |  |  |  |
| Total of Fall Semester : | | 30 |  |  |  |
| Spring | | | | | |
| 151618422 | [Chemical Technologies](#Chemica_Technologies) | 4 | 3-0-0 | C | Turkish |
| 151618424 | [Chemical Engineering Laboratory III](#Che_Engin_Lab_III) | 5 | 0-0-4 | C | Turkish |
| 151618567 | [Design in Chemical Engineering II](#DiC_Engin_II) | 7 | 3-2-0 | C | Turkish |
| 151618568 | [Project and Risk Management](#project_risk) | 3 | 2-0-0 | C | Turkish |
|  | [Internship I](#ınternship_1) | 1 |  |  |  |
|  | [Internship II](#ınternship_2) | 2 |  |  |  |
|  | [Internship III](#ınternship_3) | 2 |  |  |  |
|  | ENGINEERING RESEARCH | 6 | 1-4-0 | E | Turkish |
| 151618534 | [Recovery of Wastes Research](#Recovery_Waste_Res) |  |  |  |  |
| 151618535 | [Research on Energy Conversion Technologies](#Researc_Energy_Conversio_Technologi) |  |  |  |  |
| 151618542 | [Evaluation of Wastes Research](#Waste_Evaluation_Research) |  |  |  |  |
| 151618575 | [Synthesis and Characterization Research of New Generation Materials](#new_generation_materrial) |  |  |  |  |
| 151618566 | [Inorganic Technologies Research](#Inorganic_Technologies_Research) |  |  |  |  |
| 151618537 | [Research in Synthetic Fuel Characterization](#Research_Synthetic_Fuel_Characterizat) |  |  |  |  |
| 151618538 | [Alternative Energy Sources Research](#Alternative_Energy_Sources) |  |  |  |  |
| 151618564 | [Research of Industrial Raw Materials](#Research_ndustrial_Raw_Materials) |  |  |  |  |
| 151618570 | [Fuel Cell Technologies Research](#Fuel_Cell_Technologies_Research) |  |  |  |  |
| 151618553 | [Research on Instrumental Methods in the Examination of Solids](#Research_Instrumental_Methods_in) |  |  |  |  |
| 151618539 | [Solid-Liquid Extraction Research](#Solid_Liquid_Extraction) |  |  |  |  |
| 151618540 | [Wastewater Treatment Research](#Wastewater_Treatmen) |  |  |  |  |
| 151618569 | [Energy Storage Materials Research](#Energ_Storage_Materials_research) |  |  |  |  |
| 151618543 | [Electrochemical Methods Research](#Electrochemical_Methods_research) |  |  |  |  |
| 151618536 | [Polymer Technologies Research](#Polyme_Technologies_esearch) |  |  |  |  |
| 151618554 | [Polymer Synthesis and Characterization Research](#Polymer_Synthesis_and_Characterization) |  |  |  |  |
| 151618546 | [Adsorption Researches](#adsorption) |  |  |  |  |
| 151618547 | [Characterization of Porous Solids Research](#Characterization_Porous_Solids_Resear) |  |  |  |  |
| 151618548 | [Ion Exchange and Adsorption Research](#Ion_exchange_Adsorption) |  |  |  |  |
| 151618550 | [Experimental Design in Chemical Engineering Research](#Experimenta_Design_Chemical_Engineer_res) |  |  |  |  |
| 151618551 | [Evaluation of Biomass Research](#Evaluation_Biomass_Researches) |  |  |  |  |
| 151618552 | [Sorption Processes For Water TreatmentResearches](#Sorptıon_Processe_For) |  |  |  |  |
| 151618555 | [Industrial Waste and Residue Evaluation Research](#Industrial_Waste_Residue_Evaluation) |  |  |  |  |
| 151618556 | [Soil and Water Pollution Research](#Soil_Water_ollution_Research) |  |  |  |  |
| 151618560 | [Researches of Sythesis and Characretorization of Catalysts](#Researches_Sythesis_Characretoriz_cataly) |  |  |  |  |
| 151618561 | [Chemical Technologies Research](#Chemica_Technolog_Research) |  |  |  |  |
| 151618562 | [Resource and Energy Recovery from Solid Wastes Research](#Resource_nergy_Recoveryfrom_Solid) |  |  |  |  |
| Total of Spring Semester : | | 30 |  |  |  |
| TOTAL : | | 240 |  |  |  |

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Chemistry I | 151611204 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 4 | 0 | 4 | 6 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 4 | - | - | - | - |

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

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| **PREREQUIEITE(S)** | - |
| **Course Objectives** | Introducing the main topics in chemical science and giving the basic chemistry information required in chemical engineering |
| **Course Description** | Properties of matters and measurements, atoms and atomic theory, periodic system, chemical compounds, chemical reactions and stoichiometry, gases and mixtures of gases, thermochemistry |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explain and classify the properties of matters | 1b | 1, 6 | A |
| **2** | Explain atoms and atomic theory | 1b | 1, 6 | A |
| **3** | Explain and use the mole concept and Avogadro’s Law | 1b | 1, 6 | A |
| **4** | Explain stoichiometry. | 1b | 1, 6 | A |
| **5** | Name and formulate chemical compounds, inorganic and organic compounds. | 1b | 1, 6 | A |
| **6** | Define, explain, and use the properties of gases, gas pressure, gas laws, the ideal and general gas equations | 1b | 1, 6 | A |
| **7** | Explain thermochemistry. | 1b | 1, 6 | A |
| **8** | Explain quantum theory and electron structure of atoms. | 1b | 1, 6 | A |
| **9** | Explain periodic relationship of elements. | 1b | 1, 6 | A |
| **10** | Explain chemical bonding. | 1b | 1, 6 | A |
| **11** | 11 Explain intermolecular forces. | 1b | 1, 6 | A |
| **12** | Explain liquids and solids. | 1b | 1, 6 | A |

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| **TextBook** | Raymond Chang, Kenneth A. Goldsby, “Genel Kimya”, Çeviri Editörleri: Recai İnam ve Serpil Aksoy, Palme YAyıncılı, Ankara, 2014. |
| **Other References** | 1. Petrucci, H., Harwood, W. S., Herring, F. G., “Genel Kimya: İlkeler ve ModernUygulamalar” (I. ve II. Cilt), Çeviri Editörleri: Uyar. T., Aksoy, S., Palme Yayıncılık,Ankara, 2002. 2. Mortimer, C. E., “Modern Üniversite Kimyası” (I. ve II. Cilt) , Çeviri, ÇağlayanKitabevi, İstanbul, 1988. 3. Sienko, M. J., Plane, R. A., “Temel Kimya”, Çeviri, SavaşYayınları, Ankara,1983. 4. Erdik, E., Sarıkaya, Y., “Temel Üniversite Kimyası”, HacettepeTaş Kitapçılık, Ankara, 1987. |
| **Tools and Equipments Required** | Computer |

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| **COURSE SYLLABUS** | |
| **1** | Chemistry, Properties of Matter and Measurement |
| **2** | Atoms, Molecules and Ions |
| **3** | Stoichiometry, Mass-Mole relationship |
| **4** | Stoichiometry, Mass-Mole relationship |
| **5** | Aqueous Solution Reactions |
| **6** | Gasses |
| **7** | Gasses |
| **8** | **MIDTERM** |
| **9** | Thermochemistry |
| **10** | Thermochemistry |
| **11** | Quantum Theory and the Electron Structure of Atoms |
| **12** | Periodic Relationships of Elements |
| **13** | Chemical Bonding I and Chemical Bonding II |
| **14** | Intermolecular Forces |
| **15** | Liquids and Solids |
| **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 | 4 | 56 |
| 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 | 1 | 30 | 30 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 30 | 30 |
|  | **Total workload** | | **176** |
|  | **Total workload / 30** | | **5,86** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 50 |
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|  |  |
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| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Introduction To Chemical Engineering | 151611132 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Theory** |
| 1 | 2 | 0 | 2 | 3 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  |  |  |

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

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| **Prerequisite Courses** | - |
| **Course Objectives** | To supply learning evolution of chemistry and chemical engineering, understanding the important basic professional concepts and techniques, unit systems, units and conversions essentiality in education and professional career, general rules solving the problems.  To supply understand ethics and engineering ethics concepts to the students. |
| **Course Description** | Definition, history and evolution of chemical engineering; chemical engineering education in our department and in Turkey; some important concepts in chemical engineering; unit systems; dimensionless groups and dimensional analysis, approaching to problem solving, introduction to engineering ethics, student presentations. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Describe the chemical engineering, remind its historical evaluation and associate it with current situation. | 1c | 1, 12 | A |
| **2** | Explain some important concepts in chemical engineering | 1c, 6b | 1, 12 | A, D |
| **3** | An awareness of the units and unit systems, establish relations with correlative conversions and make dimensional analysis. | 1c, 6b | 1, 12 | A, D |
| **4** | Solve the problems graphically. | 1c | 1 | A |
| **5** | Explains ethics, engineering ethics, moral concepts and ethical codes and can discuss events and facts from an ethical perspective. | 9a, 6a | 1 | A, B |
| **6** | Defines sustainability and realizes its importance. | 10c | 1, 12 | A, D |
| **7** | Prepares an assignment, examines, comments, evaluates and presents it while preparing the assignment. | 6b, 7a, 8 | 15 | D |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Sümer M. Peker, Karagöz Moral, A. Kimya Mühendisliğinde Yönelim, Palme Yayıncılık, 2012. |
| **Other References** | 1.Gültekin S., Kimya Mühendsiliğine Girişi Papatya Yayıncılık, 2013.  2.Fleddermann C. B., “Engineering Ethics”, 2nd ed., Pearson, Prentice Hill, 20043.  3.Çataltaş, İ.,”Sınai Stokimetri”, İnkilap-Aka Kitapevleri, İstanbul, 1975.4. Kuleli, Ö., 4.“Kimya Mühendisliğine Giriş, Kütle ve Enerji Denklikleri”, Meteksan Yayınları No. 4, Ankara, 1982. |
| **Tools And Equıpments Required** | Computer, projector |

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| **COURSE SYLLABUS** | |
| **1** | Meeting; Introducing of Department and Programme |
| **2** | Historical evolution of chemistry and chemical engineering |
| **3** | Some important items in chemical engineering |
| **4** | Measurement and units and unit systems |
| **5** | Conversion of units |
| **6** | Dimensional Analysis |
| **7** | Approaching to problem solving and graphical solutions |
| **8** | **MIDTERM** |
| **9** | Ethics and Engineering Ethics |
| **10** | Ethics and Engineering Ethics |
| **11** | Ethics and Engineering Ethics |
| **12** | Sustainability, Quiz |
| **13** | Meeting alumni |
| **14** | Student presentations |
| **15** | Student presentations |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 8 | 1 | 8 |
| Homework | 1 | 10 | 10 |
| Quiz | 1 | 1 | 1 |
| Quiz preparation | 1 | 5 | 5 |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) | 1 | 5 | 5 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 6 | 6 |
| Semester final exam | 1 | 2 | 12 |
| Final exam preparation | 1 | 11 | 11 |
|  | **Total workload** | | **88** |
|  | **Total workload / 30** | | **2.9** |
|  | **Course ECTS Credits** | | **3** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Quiz | 5 |
| Homework | 20 |
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|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 1 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 4 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development | 1 |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof.Dr.Neşe Öztürk | Prof.Dr.Yeliz Aşcı |  |  |
| **Signature** |  |  |  |  |

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**

**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Turkish Language I | 151611181 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 2 |  | 0 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  |  | 2 |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | Informing students about the current state of development and the richness of Turkish language, bring awareness of a national language, literally to know about the subtleties about Turkish and be able to use them in their daily lives to ensure. |
| **Course Description** | Definition of language, language families on the world and Turkish’s place among the world languages, the historical development of Turkish written language, phonetic word recognition events in Turkish. Gain the ability to write proper composition. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Students express language families on the world and Turkish’s place among the world languages. | 7a | 1 | A |
| **2** | Defines the rules of Turkish. | 7a | 1 | A |
| **3** | Recognize the sound events. | 7a | 1 | A |
| **4** | Apply the spelling rules | 7a | 1 | A |
| **5** | Prepare written and oral composition. | 7a | 1 | A |
| **6** | Use Turkish correctly. | 7a | 1 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1. Kültür, M. E., “Üniversiteler İçin Türk Dili”, Bayrak Yayınları, İstanbul, 1997.  2. “Türk Dil Yazım Kılavuzu”, TDK Yayınları, 24. baskı, Ankara, 2005. |
| **Other References** | 1. Kaplan, M., “Kültür ve Dil”, 8. baskı, ,Dergah Yayınları, İstanbul, 1993.  2. Fuat, M., “Dil Üstüne”, Adam Yayınları, İstanbul, 2001.  3. Ercilasun, A. B., “Başlangıçtan Yirminci Yüzyıla Türk Dili Tarihi”, Akçağ Yayınları, 1. baskı, Ankara, 2004.  4. Aksan, D., “Türkçe’nin Gücü”, Bilgi Yayınevi, 4. baskı, Ankara, 1997.  5. Karamanlıoğlu, A., “Türk Dili”, Degah Yayınları, 3. baskı, İstanbul, 1984.  6. Anday, M. C., “Dilimiz Üstüne Konuşmalar”, YKY, İstanbul, 1996.  7. Karaağaç, G., “Dil Tarih ve İnsan”, Akçağ Yayınevi, Ankara, 2002.  8. Aksan, D., “Dil Şu Büyülü Düzen”, Bilgi Yayınevi, Ankara, 2003.  9. Banarlı, N. S., “Türkçe’nin Sırları”, 18. baskı, Kubbealtı Neşriyatı, İstanbul, 2002. |
| **Tools and Equipment Required** | DVD, VCD, projector, computer. |

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| **COURSE SYLLABUS** | |
| **1** | Definition and Features of Language |
| **2** | Languages on the world and Turkish’s place among the world languages from origin and structure sides |
| **3** | Importance of Language for culture and nationality, Language Policies |
| **4** | Speech Language and Specifications (Polish, Accent, Oral) |
| **5** | Writing Language and Specifications |
| **6** | Classification of Sounds |
| **7** | Sound Changes, Sound Events |
| **8** | **MIDTERM** |
| **9** | Rules of Writing |
| **10** | Rules of Writing |
| **11** | Rules of Writing |
| **12** | Rules of Writing |
| **13** | Written Composition Exercises |
| **14** | Studies of planned essay writing |
| **15** | Studies of planned essay writing |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 5 | 2 | 10 |
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|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 2 | 5 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 2 | 5 | 10 |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Physics I | 151611195 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 3 | 0 | 3 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 3 |  |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | To teach the basic concepts and laws of physics and practices of daily life. |
| **Course Description** | Measurement and units; vectors; Kinematics; Dynamics; Work and Energy; Linear Momentum and Collisions; Rotational Motion; Equilibrium. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Understands the importance of measurement and the units | 1b | 1, 6 | A |
| **2** | Solve motion problems | 1b | 1, 6 | A |
| **3** | Explain the basic laws of physics and concepts | 1b | 1, 6 | A |
| **4** | Students realize of the variety problems of physical systems and solve these problems. | 1b | 1, 6 | A |
| **5** | Use energy and momentum concepts in problem solving | 1b | 1, 6 | A |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Özdaş, K., Yörükoğulları, E., “Uygulamalı Temel Fizik (Mekanik)”, Bilim Teknik Yayınevi; Eskişehir, 1985. |
| **Other References** | 1. Fishbane, Gosiorowicz, Thornton , “Temel Fizik Cilt I” Arkadaş Yayınevi, 2003.  2. Serway, “Fen ve Mühendislik İçin Fizik Cilt I”, Palme Yayıncılık, 1996. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Measurement and Units |
| **2** | Vectors |
| **3** | Motion in One Dimension |
| **4** | Motion in Two Dimensions |
| **5** | Newton’s Laws |
| **6** | Applications of Newton’s Laws |
| **7** | Work and Power |
| **8** | **MIDTERM** |
| **9** | Energy |
| **10** | Energy |
| **11** | Linear Momentum and Collisions |
| **12** | Rotational Motion |
| **13** | Applications of Rotational Motion |
| **14** | Equilibrium |
| **15** | Equilibrium |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| 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 | 1 | 7 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 10 | 1 | 10 |
|  | **Total workload** | | **83** |
|  | **Total workload / 30** | | **2.77** |
|  | **Course ECTS Credits** | | **3** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Toplam** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Physics Laboratory I | 151611196 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 0 | 2 | 1 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 |  |  |  |  |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To teach the basic principles and concepts of physics experimentally, to gain the ability to conduct experiments, evaluate and interpret the results. |
| **Course Description** | Motion with Constant Acceleration, Newton’s Second Law, Spiral Spring; Viscosity, Surface Tension Density, Moment of Inertia |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Apply the basic principles and concepts of physics experimentally | 1b, 5b | 1, 3, 15 | A, E |
| **2** | Collect data. | 1b, 5b | 1, 3, 15 | E |
| **3** | Evaluates and discuss the experimental results. | 1b, 5b | 1, 3, 15 | A, E |
| **4** | Write report. | 1b, 5b | 1, 3, 15 | E |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Fizik I-II Deneyleri (Prof. Dr. Naci Ekem, Doç. Dr. Mustafa Şenyel) |
| **Other References** | Physics books covering related topics |
| **Tools and Equipment Required** | It is located in the laboratory. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction of the laboratory and formation of groups |
| **2** | Motion with Constant Acceleration |
| **3** | Motion with Constant Acceleration |
| **4** | Newton’s second law |
| **5** | Newton’s second law |
| **6** | Spiral spring |
| **7** | Spiral spring |
| **8** | **MIDTERM** |
| **9** | Viscosity |
| **10** | Viscosity |
| **11** | Surface Tension |
| **12** | Density |
| **13** | Moment of Inertia |
| **14** | Compensatory experiments |
| **15** | Compensatory experiments |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 8 | 2 | 16 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 7 | 1 | 7 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **58** |
|  | **Total workload / 30** | | **1.93** |
|  | **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Report | 50 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 5 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Calculus I | 151611203 |

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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** |
| 4 |  |  |  |  |

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

|  |  |
| --- | --- |
| **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 |

|  |  |
| --- | --- |
| **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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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 5 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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| metin, simge, sembol, amblem, logo içeren bir resim  Açıklama otomatik olarak oluşturuldu | **ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**  **COURSE INFORMATION FORM** | amblem, simge, sembol, daire, logo içeren bir resim  Açıklama otomatik olarak oluşturuldu |

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| **Course Name** | **Course Code** |
| Information Technologies | 151611205 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 2 | 0 | 2 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | 2 | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To make students to be able to solve problems, analyze data by using Excel programme which is the most commonly used programme in engineering |
| **Course Description** | MS Excel |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | To be able to operate in calculation tables (MS Excel). | 4b, 8 | 1, 5, 6 | A, D |
| **2** | To be able to draw graphics by using calculation tables (MS Excel). | 4b, 8 | 1, 5, 6 | A, D |
| **3** | To be able to make solutions using numerical methods with calculation tables (MS Excel). | 4b, 8 | 1, 5, 6 | A, D |
| **4** | To be able to solve engineering problems in different ways by using calculation tables (MS Excel). | 4b, 8 | 1, 5, 6 | A, D |
| **5** | - |  |  |  |
| **6** | - |  |  |  |
| **7** | - |  |  |  |
| **8** | - |  |  |  |
| **9** | - |  |  |  |
| **10** | - |  |  |  |

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| --- | --- |
| **Basic Course Book** | Course books are not used. |
| **Supporting Resources** | -Cutlip, M.B., Shacham, M., “Problem Solving in Chemical and Biochmeical Engineering with Polymath, Excel and Matlab”, 2. Baskı, Pearson Education, 2008.-Finlayson, B.A., “Introduction to Chemical Engineering Computing”, 2. Baskı, Wiley, 2012. |
| **Tools and Equipment Required for the Course** | One computer for every student. |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Introduction to Microsoft Excel 2016 |
| **2** | Microsoft Excel 2016 workbook and worksheet related operations |
| **3** | Microsoft Excel 2016 Information Entry and Formulas |
| **4** | Microsoft Excel 2016 Mathematical and Trigonometric Functions |
| **5** | Drawing a graph with Microsoft Excel 2016 |
| **6** | Curve fitting with Microsoft Excel 2016 |
| **7** | Microsoft Excel 2016 equation solver add-in |
| **8** | **MIDTERM** |
| **9** | Create a macro with Microsoft Excel 2016 |
| **10** | Create a macro with Microsoft Excel 2016 |
| **11** | Create a macro with Microsoft Excel 2016 |
| **12** | Introduction to basic programming commands with Microsoft Excel 2016 |
| **13** | Examples of numerical methods with Microsoft Excel 2016 |
| **14** | Examples of solutions to chemical engineering problems with Microsoft Excel 2016 |
| **15** | Examples of solutions to chemical engineering problems with Microsoft Excel 2016 |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | - | - | - |
| Homework | - | - | - |
| Quiz | 6 | 2 | 12 |
| 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 | 1 | 2 | 2 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 2 | 2 |
|  | **Total workload** | | 48 |
|  | **Total workload / 30** | | 1.6 |
|  | **Course ECTS Credits** | | **2** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Ouiz | 30 |
| Midterm | - |
| Midterm | - |
| Midterm | - |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 5 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 5 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| English I | 151011209 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 3 |  | 0 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  |  | 3 |

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

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| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | This lesson is programmed to give the basic vocabulary and grammar and make the students hear, understand, speak and write in English at elementary level. |
| **Course Description** | Fundamental concepts and knowledge |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Use the basic grammar rules | 7b | 1 | A |
| **2** | Understanding and making dialogues | 7b | 1 | A |
| **3** | Explains an English text on its subject. | 7b | 1 | A |
| **4** | Communicates in written and verbal English. | 7b | 1 | A |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Basic Course Book** | 1.English For Life, Elementary Student’s Book, Oxford University Press  2.English For Life, Elementary Workbook, Oxford Universty Press  3.English For Life, Pre-intermediate Student’s Book, Oxford University Press  4.English For Life, Pre-intermediate Workbook, Oxford University Press |
| **Supporting Resources** | 1.Murphy, R., 2004, English Grammar in Use, Cambridge University Press,  2.Dictionary of Contemprary English, Longman.  3.Start Up Comprehensive English Practice, 2007, Nüans Publishing, |
| **Tools and Equipment Required for the Course** | Lecturing the subject, repetition with example sentences, performing the exercises together by requesting the participation of the students, listening and repeating the pieces, Workbook study. |

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| **COURSE SYLLABUS** | |
| **1** | Subject Pronouns, definite article, *To be*, plurals, uncountable, possessives, *have got/has got,* how many, how much, any |
| **2** | Prepositions of time, prepositions of place, there is/ there are, quantities |
| **3** | The imperatives, object pronouns, can/can’t for ability, present simple, adverbs of frequency |
| **4** | Future Simple 1(be going to), would like, can/may for permission |
| **5** | Modals: must, have to, mustn’t, can’t, don’t have to, needn’t, suggestion |
| **6** | Present continuous, Quantities:a lot of,/lots of, much, many |
| **7** | Comparison of present simple and present continuous, non-continuous verbs, Past forms of *to be* (was/were), used to, past simple tense |
| **8** | **MIDTERM** |
| **9** | Comparison:comparative form, superlative form, as-as/so-as |
| **10** | Future simple 2, past modals: had to, didn’t have to, could, couldn’t, question tags |
| **11** | Conditional clauses: type 0, type 1, past continuous |
| **12** | Relative clauses, order of adjectives, adverbs, superlative forms of adverbs, |
| **13** | Relative clauses, order of adjectives, adverbs, superlative forms of adverbs, |
| **14** | Comperatives forms of present perfect simple, cojunctions of contrast, |
| **15** | May/might for possibility, future tense(revision), would like |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 5 | 2 | 10 |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 2 | 5 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 2 | 5 | 10 |
|  | **Total workload** | | **74** |
|  | **Total workload / 30** | | **2.5** |
|  | **Course ECTS Credits** | | **3** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Report Writing Technique | 151611206 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 1 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  | 2 |  |

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

|  |  |
| --- | --- |
| **Prerequisite Courses** |  |
| **Course Objectives** | to gain abilities of making the research by learning research techniques efficiently, effective communication orally and in writing and writing reports which are technical, social and for other purposes. |
| **Course Description** | Scientific research method, research types and data collecting methods, source compiling, structure of research text, report writing and oral presentation, writing the reports concerning school, daily, business and academic life. |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Becomes aware of the scientific research method. | 8 | 1 | A |
| **2** | Uses the research resources effectively. | 6a, 6b, 8 | 11 | D |
| **3** | Prepares the research report, homework, lab reports, petitions and curriculum vitae according to the rules. | 6a, 6b, 7a, 7c | 1, 11, 15 | A, D |
| **4** | Realizes that the importance of referring to the source in research reports. | 8 | 1, 15 | A, D |
| **5** | Recognizes the types of reports in business life. | 7a, 8 | 1 | A |
| **6** | Recognizes the types of presentations (thesis, paper, article, poster). in academic life | 7a, 8 | 1 | A |
| **7** | Submits the homework orally. | 6a, 6b, 7a, 7d | 12, 15 | D |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Basic Course Book** | Seyidoğlu, H., “Bilimsel Araştırma ve Yazma El Kitabı”, 8. Baskı, Güzem Yayınları, İstanbul, 2003. |
| **Supporting Resources** | 1. Üstdal, M. ve Gülbahar, K., “Bilimsel Araştırma Nasıl Yapılır Nasıl Yazılır”, Beta Basım A.Ş., İstanbul, 1997.  2. Karasar, N., Araştırmalarda Rapor Hazırlama, Nobel Yayın., 19. Baskı, Ankara, 2015.  3. Karasar, N., Bilimsel Araştırma Yöntemi, 17. Baskı, Nobel Yayın Dağıtım, Ankara, 2007. |
| **Tools and Equipment Required for the Course** | Computer, projector |

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| **COURSE SYLLABUS** | |
| **1** | Students are informed about the course content, evaluation of notes and assignments. The four groups of tasks created for assignments will be prepared as a group. |
| **2** | Scientific Research Method |
| **3** | Literature Review and Research Techniques |
| **4** | Research Report and Formal Structure |
| **5** | Considerations representation of the source |
| **6** | Types of Reading and Reading to Learn, Preparing for the exam and things to be considered exam paper |
| **7** | Experiment Report Layout and Preparation for Laboratory Courses |
| **8** | **MIDTERM** |
| **9** | Preparation of Internship Book and Internship Report, Petition and CV Writing |
| **10** | Reports in Business Life |
| **11** | Original Research Article |
| **12** | Thesis, Paper, Poster and Oral Presentation Techniques |
| **13** | Student presentations |
| **14** | Student presentations |
| **15** | Student presentations |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| Homework | 2 | 15 | 30 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 8 | 8 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 8 | 8 |
|  | **Total workload** | | **90** |
|  | **Total workload / 30** | | **3** |
|  | **Course ECTS Credits** | | **3** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Homework | 30 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 4 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 4 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 5 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Fatma Tümsek | Prof. Dr. Duygu Kavak |  |  |
| **Signature** |  |  |  |  |

1/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Turkish Language II | 151612182 |

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

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  |  | 2 |

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

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| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | To show the richness of Turkish by informing students about the development and current situation of Turkish and to raise awareness of the national language. |
| **Course Description** | Words in terms of structure, word groups, nouns, adjectives, pronouns, adverbs, prepositions, verbs, sentences, types of written compositions, types of oral compositions, speaking practices, planned writing practices, text analysis. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines the rules of Turkish. | 7a | 1 | A |
| **2** | Defines and classifies word groups in terms of structure. | 7a | 1 | A |
| **3** | Analyzes sentence structure. | 7a | 1 | A |
| **4** | Creates written and oral composition. | 7a | 1 | A |
| **5** | Uses Turkish correctly. | 7a | 1 | A |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1. Kültür, M. E., “Üniversiteler İçin Türk Dili”, Bayrak Yayınları, İstanbul, 1997.  2.Yavuz, K., Yetiş, K., Birinci, N., 1999, Üniversite Türk Dili ve Kompozisyon Dersleri, Bayrak Yayınları, İstanbul. |
| **Other References** | 1. Kaplan, M., “Kültür ve Dil”, 8. baskı, ,Dergah Yayınları, İstanbul, 1993.  2. Fuat, M., “Dil Üstüne”, Adam Yayınları, İstanbul, 2001.  3. Aksan, D., “Türkçe’nin Gücü”, Bilgi Yayınevi, 4. baskı, Ankara, 1997. |
| **Tools and Equipment Required** | DVD, VCD, projector, computer. |

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| **COURSE SYLLABUS** | |
| **1** | Words in Terms of Structure; Word Groups |
| **2** | Noun |
| **3** | Adjective |
| **4** | Pronoun |
| **5** | Adverb |
| **6** | Preposition, Conjunction, İnterjection |
| **7** | Verb |
| **8** | **MIDTERM** |
| **9** | Sentence, Elements of the Sentence |
| **10** | Sentence, Elements of the Sentence |
| **11** | Written Composition Types |
| **12** | Types of Verbal Composition |
| **13** | Prepared Speaking Practice, Unprepared Speaking Practice |
| **14** | Text Analysis Studies |
| **15** | Text Analysis Studies |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
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| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 2 | 2 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 2 | 2 |
|  | **Total workload** | | **48** |
|  | **Total workload / 30** | | **1.6** |
|  | **Course ECTS Credits** | | **2** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Chemistry II | 151612208 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 4 | 0 | 4 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 4 | - | - | - | - |

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

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| --- | --- |
| **Prerequieite(s)** | None |
| **Course Objectives** | To give the basic concepts that may be required in chemistry education and to create the infrastructure for the student to start the chemistry undergraduate program. |
| **Course Description** | Solutions and Physical Properties, Chemical Kinetics, Chemical Equilibrium, Thermodynamics, Electrochemistry, Nuclear Chemistry. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines solutions, explains their differences/similarities with examples, and classifies them. | 1b | 1, 2, 5, 10 | A |
| **2** | Examines and classifies the reaction rate, factors affecting the reaction rate, and reaction types. | 1b | 1, 2, 5, 10 | A |
| **3** | Defines and relates balance and parameters affecting balance. | 1b | 1, 2, 5, 10 | A |
| **4** | Defines and clarifies the laws of thermodynamics | 1b | 1, 2, 5, 10 | A |
| **5** | Defines and compares electrochemistry and batteries. | 1b | 1, 2, 5, 10 | A |
| **6** | Defines nuclear reactions and radioactivity and explains with examples. | 1b | 1, 2, 5, 10 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Genel Kimya, Temel Kavramlar, Chang, R. Çeviri Ed. Uyar, T., Aksoy, S., İnam, R. Dördüncü baskıdan çeviri, Palme Yayıncılık, Ankara 2011 |
| **Other References** | Petrucci, H., Harwood, W.S., Herring, F.G., “Genel Kimya: İlkeler ve Modern Uygulamalar” (I. ve II. Cilt)”, Çeviri Editörleri: T. Uyar, S. Aksoy, Sekizinci Baskıdan Çeviri, Palme Yayıncılık, Ankara, 2002. |
| **Tools and Equipment Required** | Classroom facilities, computer, projector |

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| **COURSE SYLLABUS** | |
| **1** | Solution Types, Concentration Units, Solution Concentrations |
| **2** | Effect of Temperature on Solubility, Effect of Pressure on Solubility of Gases, Numerical Properties |
| **3** | Rate of Chemical Reaction, Measurement of Reaction Rate, Rate Laws |
| **4** | Relationship between Reactant Concentrations and Time in Chemical Reactions, Temperature Dependence of Activation Energy and Rate Constant |
| **5** | Reaction Laws, Catalysis, Chemical Equilibrium Concept |
| **6** | Expression Forms of Equilibrium Constants, Factors Affecting Chemical Equilibrium |
| **7** | Expression Forms of Equilibrium Constants, Factors Affecting Chemical Equilibrium |
| **8** | **MIDTERM** |
| **9** | Three laws of thermodynamics, Intentional Events, Entropy |
| **10** | Second Law of Thermodynamics, Gibbs Free Energy |
| **11** | Free Energy and Chemical Balance, Redox Reactions |
| **12** | Galvanic Cells, Standard Reduction Potentials |
| **13** | Voluntariness of Redox Reactions, Effect of Concentration on the Cell's EMF |
| **14** | Nature of Nuclear Reactions, Nuclear Stability, Nuclear Transmutation |
| **15** | Nuclear Fission, Nuclear Fusion |
| **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 | 4 | 56 |
| 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 | 1 | 25 | 25 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 30 | 30 |
|  | **Total workload** | | **171** |
|  | **Total workload / 30** | | **5.7** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 50 |
| Quiz |  |
| Homework |  |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

15/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Chemical Laboratory | 151612188 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 0 | 2 | 1 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 |  |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Chemistry I course taken, Chemistry II course taken or taken in the same semester. |
| **Course Objectives** | Toensure that the experimental application of the theoretical knowledge gained within the scope of the chemistry course is carried out in accordance with laboratory safety rules, to give the ability to analyze-interpret experimental data and prepare a written presentation as a member of a group. |
| **Course Description** | Verification of the definite proportions Law, calculation of the molar volume and ideal gas constant of a gas, calculation of the equivalent weight and atomic weight of a metal, effect of concentration and temperature on the reaction rate, determination of the heat of reaction and verification of Hess's law, solution conductivity, pH and pH indicators, verification of Charles' law . |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Shows verification of the Definite Proportions Law | 1b,5b,6b | 3,5,12,15 | B,E |
| **2** | Experimentally calculates the molar volume and ideal gas constant of a gas. | 1b,5b,6b | 3,5,12,15 | B,E |
| **3** | Calculates the equivalent weight and atomic weight of a metal. | 1b,5b,6b | 3,5,12,15 | B,E |
| **4** | Determines and interprets solution conductivity. | 1b,5b,6b | 3,5,12,15 | B,E |
| **5** | Analyzes the effect of concentration and temperature on the reaction rate. | 1b,5b,6b | 3,5,12,15 | B,E |
| **6** | Demonstrates determination of reaction heat and verification of Hess' Law. | 1b,5b,6b | 3,5,12,15 | B,E |
| **7** | Proves Charles' Law. | 1b,5b,6b | 3,5,12,15 | B,E |
| **8** | Examines pH and pH markers. | 1b,5b,6b | 3,5,12,15 | B,E |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | İnel, O. , “Genel Kimya Laboratuvar Kılavuzu”, Eskişehir. |
| **Other 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.  3. Sienko, M.J., Plane, R.A., “Temel Kimya (I. ve II. Cilt)”, (Çeviri), Savaş  Yayınları, Ankara, 1983.  4. Erdik, E., Sarıkaya, Y., “Temel Üniversite Kimyası”, Hacettepe Taş  Kitapçılık, Ankara, 1987. |
| **Tools and Equipment Required** |  |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Introduction of the course and giving exam percentages |
| **2** | Explanation of safety and laboratory rules that must be followed |
| **3** | Creating groups, explaining applications and report writing rules |
| **4** | Verification of the Definite Proportions Law |
| **5** | Calculating the Molar Volume and Ideal Gas Constant of a Gas |
| **6** | Calculating the Equivalent Weight and Atomic Weight of a Metal |
| **7** | Effect of Concentration and Temperature on Reaction Rate |
| **8** | **MIDTERM** |
| **9** | Determination of Reaction Heat and Verification of Hess' Law |
| **10** | Solution Conductivity |
| **11** | pH and pH markers |
| **12** | Verification of Charles's law |
| **13** | Make-up Experiments |
| **14** | Make-up Experiments |
| **15** | Make-up Experiments |
| **16,17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 8 | 2,5 | 20 |
| Homework |  |  |  |
| Quiz | 8 | 0,5 | 4 |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 8 | 1 | 8 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Quiz | 60 |
| Report | 40 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** |  |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 5 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

26/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| **Engineering Drawing** | 151612198 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 2 | 2 | 3 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | To teach types of graphics and deriving appropriate equation for data. To give ability to apply this knowledge to other courses in problem solving, data analysis and laboratory studies and reporting. To give information about technical drawing, ability to draw an object technically and ability to read a technical drawing. |
| **Course Description** | Recognize different coordinate systems, drawing of basic graphic types and deriving of proper equations for graphics, definition and importance of technical drawing, drawing projection and perspective of objects, dimensioning. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Knows the basic graphic types. | 1c, 6a | 1, 6, 11 | A, D |
| **2** | Selects and draws the appropriate graphics to the data. | 1c, 6a | 1, 6, 11 | A, D |
| **3** | Forms the appropriate equations for the data graphically. | 1c, 6a | 1, 6, 11 | A, D |
| **4** | Uses the technical drawing tools properly. | 1c, 6a | 1, 6, 11 | A, D |
| **5** | Forms the basic geometrical drawing using appropriate methods. | 1c, 6a | 1, 6, 11 | A, D |
| **6** | Draws the projection of simple objects using projection planes, projection types and appearance extraction methods. | 1c, 6a | 1, 6, 11 | A, D |
| **7** | Draws the perspective of the projected part according to technical drawing rules. | 1c, 6a | 1, 6, 11 | A, D |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

|  |  |
| --- | --- |
| **Textbook** |  |
| **Other References** | Kıraç, N., Teknik Resim, 3.Baskı, “Nobel Yayın Dağıtım”, Ankara, 2009 |
| **Tools and Equipment Required** | Computer, projector, graph papers, square, ruler, compass. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, Course Introduction, Coordinate Systems Used in Graphic Drawing |
| **2** | Drawing Column and Pie Charts |
| **3** | Drawing Graphs in Polar and Triangular Coordinate System |
| **4** | Graphing in Arithmetic and Logarithmic Coordinate System |
| **5** | Derivation of Equations for Graphs Drawn in the Arithmetic Coordinate System |
| **6** | Derivation of Equations for Graphs Drawn in the Logarithmic Coordinate System |
| **7** | Derivation of Equations for Graphs Drawn in the Semi-Logarithmic Coordinate System |
| **8** | **MIDTERM** |
| **9** | ccIntroduction to Technical Drawing, Basic Drawing Rules, Auxiliary Tools |
| **10** | Basic Geometric Drawings in Technical Drawing |
| **11** | Draws the projection of simple objects |
| **12** | Draws the projection of simple objects |
| **13** | Draws the projection of simple objects |
| **14** | Perspective Drawing and Dimensioning |
| **15** | Perspective Drawing and Dimensioning |
| **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 | 1 | 14 |
| Homework | 4 | 2 | 8 |
| 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 | 1 | 15 | 15 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 15 | 15 |
|  | **Total workload** | | **112** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credits** | | **4** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Homework | 30 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Fatma Tümsek | Doç. Dr. Musa Şölener |  |  |
| **Signature** |  |  |  |  |

1/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Physics II | 151612200 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 3 | 0 | 3 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 100 |  |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To teach the basic laws and concepts of physics and to give various applications in daily life. |
| **Course Description** | Electric Charges; Coulomb’s Law; The Electric Field; Electric Potential; Capacitance and Dielectrics; Current and Resistance; Magnetic Fields; Sources of the Magnetic Field; Faraday’s Law |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Students realize of the variety problems of physical systems and solve these problems. | 1b | 1, 5, 6, 10 | A, D |
| **2** | Understands the importance of measurement and the units. | 1b | 1, 5, 6, 10 | A, D |
| **3** | Physical systems apply in their personal daily life. | 1b | 1, 5, 6, 10 | A, D |
| **4** | Recognizes the role of physics in engineering and health sciences. | 1b | 1, 5, 6, 10 | A, D |
| **5** | Explain the basic laws of physics and concepts. | 1b | 1, 5, 6, 10 | A, D |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Karaoğlu B, 2012, Üniversiteler için Fizik, Seçkin yayıncılık |
| **Other References** | 1. Fishbane, Gosiorowicz, Thornton , 2003, Temel Fizik Cilt II, Arkadaş Yayınevi, 2003.  2. Serway, 1996, Fen Ve Mühendislik İçin Fizik, Cilt II, Palme Yayıncılık |
| **Tools and Equipment Required** | - |

|  |  |
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| **COURSE SYLLABUS** | |
| **1** | Electric Charges; Coulomb’s Law |
| **2** | The Electric Field |
| **3** | Electric Potential |
| **4** | Capacitors |
| **5** | Dielectric Materials |
| **6** | Electrical current |
| **7** | Electrical Work and Power |
| **8** | **MIDTERM** |
| **9** | Electrical Work and Power |
| **10** | Kirchoff Yasaları |
| **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** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 1 | 3 | 3 |
| Homework | 5 | 3 | 15 |
| Quiz | - | - | - |
| Quiz preparation | - | - | - |
| Oral Exam | 1 | 1 | 2 |
| 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 | 1 | 5 | 5 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **76** |
|  | **Total workload / 30** | | **2.5** |
|  | **Course ECTS Credits** | | **3** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 45 |
| Quiz | - |
| Homework | 5 |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

21/7/2022

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**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Physics Laboratory II | 151612201 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 0 | 2 | 1 | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 |  |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | Learning the basic principles and concepts of physics |
| **Course Description** | Electrolysis; Magnetic Force; Ohm's Law; Resonance tube and stable waves; Transformer |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Applies the basic laws and concepts of physics experimentally. | 1b, 5b | 1, 3, 15 | A, E |
| **2** | Collects data. | 1b, 5b | 1, 3, 15 | E |
| **3** | Evaluates and discusses the results. | 1b, 5b | 1, 3, 15 | A, E |
| **4** | Prepares report. | 1b, 5b | 1, 3, 15 | E |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Fizik I-II Deneyleri (Prof. Dr. Naci Ekem, Doç. Dr. Mustafa Şenyel) |
| **Other References** | Physics books covering related topics |
| **Tools and Equipment Required** |  |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Lab introduction and formation of groups |
| **2** | Electrolysis |
| **3** | Electrolysis |
| **4** | Magnetic Force |
| **5** | Magnetic Force |
| **6** | Ohm's Law |
| **7** | Ohm's Law |
| **8** | **MIDTERM** |
| **9** | Transformer |
| **10** | Transformer |
| **11** | Resonant tube and stable waves |
| **12** | Resonant tube and stable waves |
| **13** | Make-up Experiments |
| **14** | Make-up Experiments |
| **15** | Make-up Experiments |
| **16,17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 8 | 2 | 16 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 5 | 1 | 5 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **56** |
|  | **Total workload / 30** | | **1.87** |
|  | **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Report | 50 |
|  |  |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 5 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
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| **Course Name** | **Course Code** |
| Calculus II | 151612207 |

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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** |
| 4 |  |  |  |  |

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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** |  |  |  |  |
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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 |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 5 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

15/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ** **CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| English II | 151012210 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 3 |  | 0 | 3 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  |  | 3 |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To enable the use of intermediate English tense concepts, making sentences, understanding what is spoken and responding, and increasing vocabulary knowledge. |
| **Course Description** | Basic Concepts in English |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines basic grammar rules in English. | 7b | 1 | A |
| **2** | Analyzes English dialogues. | 7b | 1 | A |
| **3** | Explains an English text on its subject. | 7b | 1 | A |
| **4** | Communicates in written and verbal English. | 7b | 1 | A |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1.English For Life, Elementary Student’s Book, Oxford University Press  2.English For Life, Elementary Workbook, Oxford Universty Press  3.English For Life, Pre-intermediate Student’s Book, Oxford University Press  4.English For Life, Pre-intermediate Workbook, Oxford University Press |
| **Other References** | 1. Murphy, R., 2004, English Grammar in Use, Cambridge University Press,  2. Dictionary of Contemprary English, Longman.  3. Start Up Comprehensive English Practice, 2007, Nüans Publishing, |
| **Tools and Equipment Required** | Explanation of the subject, repetition with example sentences, carrying out the exercises together by asking the participation of the students, listening and repeating the listening parts, Workbook study. |

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| **COURSE SYLLABUS** | |
| **1** | Plurals, Ordinal Numbers, Possessive (‘s), *To be*, Wh-questions with *to be* |
| **2** | Prepositions of Time, Talking about days and times, Present simple and adverbs of frequency, *and, but, because,* present simple with wh-questions, |
| **3** | Talking about likes and dislikes *like +-ing*, Would like to, family members, |
| **4** | *Have / has got*, *some /any,*object pronouns, suggestions, repositions of time 2, Making polite requests, |
| **5** | Present simple and present continious, places to go; *to and at*, Past simple *to be*, making arrengements, present continious for future arrengements |
| **6** | Past simple statements, *to be good at smt*. |
| **7** | Past simple questions and hort answers, describing plans for the future |
| **8** | **MIDTERM** |
| **9** | Countable and uncountable nouns, ordering a meal, |
| **10** | Adjectives, adjective order, making comments |
| **11** | Have to, on the phone, comparatives, |
| **12** | Superlatives, giving measurements, *do +the ; do+ V-ing,* |
| **13** | Superlatives, giving measurements, do +the ; do+ V-ing, |
| **14** | Present perfect statements, questions and short answers, Present perfect and Past simple |
| **15** | Present perfect statements, questions and short answers, Present perfect and Past simple |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 5 | 2 | 10 |
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| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 2 | 5 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 2 | 5 | 10 |
|  | **Total workload** | | **74** |
|  | **Total workload / 30** | | **2.5** |
|  | **Course ECTS Credits** | | **3** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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| metin, simge, sembol, amblem, logo içeren bir resim  Açıklama otomatik olarak oluşturuldu | **ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**  **COURSE INFORMATION FORM** | amblem, simge, sembol, daire, logo içeren bir resim  Açıklama otomatik olarak oluşturuldu |

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| **Course Name** | **Course Code** |
| Basic Computer Sciences | 151612204 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 2 | 2 | 2 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To make students learrn Python which is one of the most commonly used software programme that may help students while solving engineering problems |
| **Course Description** | Software of Python |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | To be able to know the general purpose instructions and functions which is necessary to use Python software | 4b | 1, 6, 10 | A, D |
| **2** | To be able to operate the vector and matrix operations by using Python. | 1a, 4b | 1, 6, 10 | A, D |
| **3** | To be able to draw two and three dimensionals graphic. | 4b | 1, 6, 10 | A, D |
| **4** | To be able to do mathematical operations such as limits, derivatives, integrals by using Python. | 1a, 4b | 1, 6, 10 | A, D |
| **5** | To be able to scope out by using numeric methods with Python. | 1d, 4b | 1, 6, 10 | A, D |
| **6** | To be able to know how to improve an algorithm and the general logic of programming | 4b | 1, 6, 10 | A, D |
| **7** | To be able to solve complicated and long-period problems by writing programms in language of Python. | 1d, 4b | 1, 6, 10 | A, D |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | Vatansever, F., “Algoritma Geliştirme ve Programlamaya Giriş”, 15. Basım, Seçkin Yayıncılık, 2023. |
| **Other References** | 1. İnan, A., “Matlab Kılavuzu”, 3.Basım, Papatya Yayıncılık Eğitim, İstanbul, 2011, 2. Ghasem, N., Numerical Methods in Chemical Engineering Using Python® and Simulink, CRC press, 2023, 3. Jeffrey J. Heys, “Chemical and Biomedical Engineering Calculations Using Python”, JohnWiley & Sons, 2017,4. Cutlip, M., B.., “Problem solving in chemical and biochemical engineering with POLYMATH, Excel, and MATLAB”, 2nd ed, Prentice-Hall, 2008. |
| **Tools and Equipment Required** | Each student has a computer with internet connection and a projector for lectures. |

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| **COURSE SYLLABUS** | | | | |
| **1** | Introduction; Explaining the Purpose and Content of the Course | | | |
| **2** | Working with the Python User Interface | | | |
| **3** | Creating and Working with Variables Commands | | | |
| **4** | Basic mathematical operations, operations with vector arrays and matrices | | | |
| **5** | Two and three -dimensional graphics drawing with Python | | | |
| **6** | Two and three -dimensional graphics drawing with Python | | | |
| **7** | Algorithm development and programming with Python | | | |
| **8** | **MIDTERM** | | | |
| **9** | Algorithm development and programming with Python | | | |
| **10** | Algorithm development and programming with Python | | | |
| **11** | Algorithm development and programming with Python | | | |
| **12** | Sample Applications and Numerical Methods in Python | | | |
| **13** | Problem Solving Case of Chemical Engineering with Python | | | |
| **14** | Problem Solving Case of Chemical Engineering with Python | | | |
| **15** | Problem Solving Case of Chemical Engineering with Python | | | |
| **16,17** |  | | | |
| **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 | 1 | 10 |
| Homework | | 7 | 3 | 21 |
| 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 | 5 | 5 |
| Semester final exam | | 1 | 1,5 | 1,5 |
| Final exam preparation | | 1 | 10 | 10 |
|  | | **Total workload** | | 105 |
|  | | **Total workload / 30** | | 3.5 |
|  | | **Course ECTS Credits** | | **4** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Exam | 35 |
| Quiz | 25 |
| Exam |  |
| Exam |  |
| Exam |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 2 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 2 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 5 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | 1. a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| 1. b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

26/2/2024

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Differential Equations | 151613246 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 2 | 2 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 3 |  |  |  |  |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To provide students with the skills to solve differential equations required in engineering courses. |
| **Course Description** | First Order Differential Equations and Applications, Differential Equations of Order Greater than One, Higher Order Linear Differential Equations, Applications of Second Order Differential Equations, Variable Coefficient Differential Equations, Differential Equation Systems, Linear Homogeneous and Non-Homogeneous Equation Systems |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Solves first order differential equations. | 1a | 1, 6 | A |
| **2** | Solves differential equations with degree greater than one. | 1a | 1, 6 | A |
| **3** | Solves higher order linear differential equations. | 1a | 1, 6 | A |
| **4** | Solves differential equations with variable coefficients. | 1a | 1, 6 | A |
| **5** | Solves linear homogeneous and non-homogeneous systems of equations. | 1a | 1, 6 | A |
| **6** | Applies differential equations to model engineering problems. | 1a | 1, 6 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Özer, N. ve, Eser, D. “Diferensiyel Denklemler”, Eskişehir 2002. |
| **Other References** | Zill, D. G., Differential equations with boundary-value problems. USA: PWS, 1986. |
| **Tools and Equipment Required** |  |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Differential Equations and Solutions |
| **2** | First Order Differential Equations |
| **3** | First Order Differential Equations |
| **4** | First Order Differential Equations |
| **5** | Differential Equations with Degree Greater than One |
| **6** | Applications of First Order Differential Equations |
| **7** | Higher Order Linear Differential Equations |
| **8** | **MIDTERM** |
| **9** | Higher Order Linear Differential Equations |
| **10** | Applications of Second Order Differential Equations |
| **11** | Applications of Second Order Differential Equations |
| **12** | Differential Equations with Variable Coefficients |
| **13** | Differential Equation Systems |
| **14** | Systems of Linear Homogeneous and Non-homogeneous Equations |
| **15** | Systems of Linear Homogeneous and Non-homogeneous Equations |
| **16,17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **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,….) | 9 | 3 | 27 |
| 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** | | **121** |
|  | **Total workload / 30** | | **4.03** |
|  | **Course ECTS Credits** | | **4** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 5 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| History of Turkish Revolution and Principles of Kemal Atatürk: I | 151613551 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 2 | 0 | 2 | 2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | - | 2 |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | None |
| **Course Objectives** | To provide historical awareness and to ensure that the fundamental principles on which our Republic is based are necessary for individual and social freedom. |
| **Course Description** | The Last Periods of the Ottoman Empire, Intellectual Movements to Save the Empire and the Historical Environment in which Mustafa Kemal Raised.  World War I and the World Gaining a New Appearance. |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Becomes aware of history and its importance. | 6a, 8 | 1 | A |
| **2** | Explains the environment before the establishment of the Republic of Türkiye. | 6a, 8 | 1 | A |
| **3** | Realizes that the fundamental principles on which our Republic is based are necessary for individual and social freedom. | 6a, 8 | 1 | A |
| **4** |  |  |  |  |
| **5** |  |  |  |  |

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| --- | --- |
| **Textbook** | M. Derviş Kılıçkaya (ed.), “Atatürk ve Türkiye Cumhuriyeti Tarihi”, Ankara, 2005. |
| **Other References** | Atatürk, “Nutuk I-II”, Türk Tarih Kurumu Yayını, Ankara. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Concepts that have an important place in the course content: Principle, Revolution, Evolution, Reform, Revolution, Coup, Reorganization; French Revolution and its Effect on the Turkish Revolution |
| **2** | The Ottoman Empire and the Causes of the Turkish Revolution |
| **3** | The Ottoman Empire and the Causes of the Turkish Revolution |
| **4** | Weakening of the Ottoman State; Internal and External Causes of Decline |
| **5** | Renovation Efforts in the Ottoman Empire, Pre-Tanzimat Reform Movements, Tanzimat and Reform Edicts; Eastern Question |
| **6** | XIX. Political Situation of the Ottoman Empire in the 19th Century; Basic Features of the Century; Straits Problem and Independence Movements in the Ottoman Empire |
| **7** | I. Constitutional Monarchy, Declaration of the Constitution and the Birth of the Opposition; II. Declaration of the Constitutional Monarchy |
| **8** | **MIDTERM** |
| **9** | Foreign Events (Tripoli War, Balkan Wars); |
| **10** | II. Intellectual Movements in the Constitutional Monarchy Period: Westernism, Turkism, Islamism, Social Movement, Socialism (Midterm exam) |
| **11** | World War I: Causes and Beginning of the War |
| **12** | Participation of the Ottoman Empire in the War and the Fronts |
| **13** | Secret Treaties Concerning the Sharing of the Territories of the Ottoman Empire, Wilson Principles |
| **14** | Armistice of Mudros and Reactions to the Armistice |
| **15** | Armistice of Mudros and Reactions to the Armistice |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 2 | 2 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 2 | 2 |
|  | **Total workload** | | **48** |
|  | **Total workload / 30** | | **1.6** |
|  | **Course ECTS Credits** | | **2** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 5 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Physical Chemistry | 151613553 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 3 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 2 | 1 | - | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To Examine the relationships between the physical and chemical properties of substances, ideal and real gases, to give information about ideal and real mixtures |
| **Course Description** | **Phase equilibrium and** thermodynamics of phase transformations of pure substances, Physical properties of the matter, real gases,compressibility factor. Equation states of real gases, properties of the mixtures, partial molar properties, ideal mixtures, real mixtures, colligative properties |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Understands the importance of physical chemistry. | 1b | 1, 6 | A, B |
| **2** | Remembers the states of matter. | 1b | 1, 6 | A, B |
| **3** | Becomes aware of phase diagrams | 1b | 1, 6 | A, B |
| **4** | Examines the thermodynamics of phase transformation of pure substances. | 1b | 1, 6 | A, B |
| **5** | Remembers the equations of state of real gases. | 1b | 1, 6 | A, B |
| **6** | Realizes the difference in the properties of the ideal and real mixtures. | 1b | 1, 6 | A, B |
| **7** | Classifies the phase diagrams and use in phase analysis. | 1b | 1, 6 | A, B |
| **8** | Tells the differences of partially miscible and immiscible liquids. | 1b | 1, 6 | A, B |
| **9** | Calculates the colligative properties of solutions | 1b | 1, 6 | A, B |
| **10** | - |  |  |  |

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| --- | --- |
| **Textbook** | Sarıkaya, Y., “Fizikokimya”, 7. baskı, Gazi Kitabevi, Ankara, 2011. |
| **Other References** | 1. Levine, I. N., “Physical Chemistry”, 5th Ed., McGraw-Hill, New York, 2002.  2. Soydan, A. B., Erbil, C., Saraç, A. S., “Teori ve Problemleri ile Fiziksel Kimya”, Beta Basım Yayım Dağıtım A.Ş., İstanbul, 1999.  3. Mortimer, R. G., Çev. Ed.: Şanlı, O., Ünal, H. İ., “Fizikokimya”, 1. Cilt, Palme Yayıncılık, Ankara, 2004. |
| **Tools and Equipment Required** | - |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | States of matter, phase diagrams of pure matters |
| **2** | Phase equilibrium (chemical potential), thermodynamics of phase transformations of pure substances, (Clapeyron, Clausius-Clapeyron) |
| **3** | Surface tension, viscosity, |
| **4** | Deviations from the Ideal Gas Assumption (Deviations from the Boyle-Mariotte Law, Compressibility Factor) |
| **5** | Equations of State of Real Gases (van der Waals Equation, Virial Equations of State) |
| **6** | Joule Phenomenon; Joule-Thomson Effect |
| **7** | Change of Enthalpy with Pressure at Constant Temperature; Change of Cp Heating Temperature with Pressure at Constant Temperature; Fugasite |
| **8** | **MIDTERM** |
| **9** | Mixtures; Partial Molar Feature; Gibbs-Duhem Equation |
| **10** | Ideal Mixtures; Mixing Enthalpy; Gibbs Phase Rule |
| **11** | Distillation; Deviations from Raoult's Law; Henry's Law |
| **12** | Raoult's Law; Phase Diagrams of Ideal Two-Component Mixtures; Phase Analysis |
| **13** | Partially miscible and immiscible liquids; steam distillation |
| **14** | Numerical Properties of Solutions (Vapor Pressure Drop, Freezing Point Drop, Boiling Point Raise, Osmotic Pressure) |
| **15** | Activity, Lewis Randall's Rule |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 11 | 2 | 22 |
| Homework | - | - | - |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 7 | 14 |
| 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 | 1 | 16 | 16 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **120** |
|  | **Total workload / 30** | | **4** |
|  | **Course ECTS Credits** | | **4** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | 15 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Physical Chemistry Laboratory | 151613563 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 0 | 2 | 1 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 | - | - | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To teach students how to carry out experiments which application of physical chemistry course, to provide experience for students to work in team environment, to teach students how to analyze and interpret experimental data |
| **Course Description** | **Change of vapor pressure with temperature, determination of heat capacity ratio of a gas, determination of molecular weight by Rast method, solubility of salts which are dissolve less and much, investigation of miscible liquid systems, immiscible liquids and steam distillation, urface tension, partial molar volume** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Ability to specify the purpose of the experiment, experimental parameters and test method | 4a, 5b | 2,5 | B, C, E |
| **2** | Ability to collect data by conducting experiments and analyze the data. | 5b, 6b | 2, 3, 12 | E, I |
| **3** | Ability to present experimental results using appropriate graphs, tables and figures. | 4b, 5b, 6b, 7a | 12, 15 | E |
| **4** | Ability to discuss the experimental results. | 1b, 5b, 7a | 3, 5, 7, 15 | C, E |
| **5** | Ability to report experimental work in accordance with the rules | 6b, 7a | 12, 15 | E |
| **6** | Ability to take an active role within the team in the execution and reporting of the experiment. | 5b, 6b | 3, 12, 15 | E, I |
| **7** | Ability to relate engineering facts, events and situations with his experiments. | 5b | 2, 5 | B, C, E |
| **8** | Recognizes the importance of professional and ethical responsibility. | 9a | 1 | B, C, E |
| **9** | Knows laboratory safety and can apply its rules | 11 | 1 | I |
| **10** | - |  |  |  |

|  |  |
| --- | --- |
| **Textbook** | Çetişli, H., Yorgun, S., Özdemir, M., “Fiziksel Kimya Laboratuvar Kılavuzu”, Eskişehir, 1990 |
| **Other References** | Sarıkaya, Y., “Fizikokimya”, 7. baskı, Gazi Kitabevi, Ankara, 2006.Gürses, A., Bayrakçeken, S., “Deneysel Fizikokimya”, Kültür ve Eğitim Vakfı Yayınları, Erzurum, 1996.Shoemaker, D. P., Garland, C. W., Nibler, J. W., “Experiments in Physical Chemistry”, McGraw-Hill, 6th Ed., Singapore, 1996 |
| **Tools and Equipment Required** | .c |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Separating Students into Groups |
| **2** | Introduction, General Information About Laboratory Work, Introducing Experimental Setup and Devices to Students |
| **3** | Variation of Vapor Pressure with Temperature |
| **4** | Determining the Heat Capacity Ratio of a Gas |
| **5** | Solubility of Less and More Soluble Salts |
| **6** | Molecular Weight Determination by Rast Method |
| **7** | Examination of Liquid-Liquid Systems Mixing in All Proportions |
| **8** | **MIDTERM** |
| **9** | Immiscible Liquids and Water Vapor Distillation |
| **10** | Surface tension |
| **11** | Partial Molar Volume Determination |
| **12** | Make-up Experiments |
| **13** | Make-up Experiments |
| **14** |  |
| **15** |  |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 8 | 3 | 24 |
| Homework | - | - | - |
| Quiz | 8 | 0,5 | 4 |
| Quiz preparation | 8 | 2 | 16 |
| Oral Exam | 8 | 0,5 | 4 |
| Oral Exam prep | 8 | 1 | 8 |
| Report (including preparation and presentation time) | 8 | 3 | 24 |
| Project (including preparation and presentation time) | - | - | - |
| Presentation (including preparation time) | - | - | - |
|  |  |  |  |
|  |  |  |  |
| Midterm | - | - | - |
| Midterm Exam preparation | - | - | - |
| Semester final exam | - | - | - |
| Final exam preparation | - | - | - |
|  | **Total workload** | | **108** |
|  | **Total workload / 30** | | **3.6** |
|  | **Course ECTS Credits** | | **4** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Quiz | 30 |
| Oral Exam | 30 |
| Report | 40 |
|  |  |
|  |  |
| **Semester final exam** |  |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 1 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 5 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 4 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 3 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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

15/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Analytical Chemistry | 151613555 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 3 |  |  |  |  |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To provide a background in the principles of chemistry that are particularly important for analytical chemistry and to introduce analytical chemistry techniques. |
| **Course Description** | Role of analytical chemistry in science; solutions and concentration units; chemical balance; acid-base balances; gravimetric analysis methods; properties of precipitates and precipitants; separation of ions by control of the concentration of the precipitating reagent; volumetric analysis methods; acid-base titrations. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines and formulates solution concentrations. | 1b | 1, 6 | A, B, D |
| **2** | Explains chemical equilibrium and defines the equilibrium constant. | 1b | 1, 6 | A, B, D |
| **3** | Examines the balance of acids and bases and calculates the pH value of solutions. | 1b | 1, 6 | A, B, D |
| **4** | Makes the necessary calculations to prepare buffer solution. | 1b | 1, 6 | A, B, D |
| **5** | Solve problems using gravimetric analysis methods. | 1b | 1, 6 | A, B, D |
| **6** | Calculates the reagent concentration required to separate ions from each other by precipitation. | 1b | 1, 6 | A, B, D |
| **7** | Solve problems using titrimetric analysis methods. | 1b | 1, 6 | A, B, D |
| **8** | Solves problems related to titration of strong and weak acids and bases. | 1b | 1, 6 | A, B, D |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Skoog, D. A., West, D. M., Holler, F. J., Çeviri: Kılıç, E. ve Köseoğlu F., “Analitik Kimya Temelleri”, 8. Baskı, Saunders College Publishing, BilimYayıncılık, 2008. |
| **Other References** | 1. Harris, D. C., Çeviri: Somer, G., Solak, A. O., Türker, A.R., “Analitik Kimya”,  Gazi Büro Kitabevi, Ankara, 1994.  2. Gündüz, T., “Kantitatif Analiz Ders Kitabı”, 7. Baskı, Gazi Kitabevi, Ankara, 2005.  3. Gündüz, T., “Kalitatif Analiz Ders Kitabı”, 6. Baskı, Gazi Kitabevi, Ankara, 1999. |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Analytical Chemistry and Its Role in Science |
| **2** | Calculations Used in Analytical Chemistry; Solution Concentrations; Chemical Stoichiometry |
| **3** | Aqueous Solutions and Chemical Equilibrium; Equilibrium Constant Expressions |
| **4** | Ionization of Acids and Bases |
| **5** | Buffer Solutions |
| **6** | Gravimetric Analysis Methods; Properties of Precipitates and Precipitants |
| **7** | Gravimetric Calculations |
| **8** | **MIDTERM** |
| **9** | Separation of Ions by Controlling the Concentration of the Precipitating Reagent |
| **10** | Some General Terms of Volumetric Titrimetry and Standard Solutions; Volumetric Calculations |
| **11** | Theory of Neutralization Titrations |
| **12** | Titrations of Strong Acids and Bases |
| **13** | Titrations of Weak Acids and Bases |
| **14** | Titrations of Very Weak Acids |
| **15** | Titration Curves for Polyfunctional Acids and Bases |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 12 | 1 | 12 |
| Homework |  |  |  |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 10 | 20 |
| 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 | 1 | 20 | 20 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **120** |
|  | **Total workload / 30** | | **4** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Quiz | 30 |
|  |  |
|  |  |
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| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof.Dr. Fatma Tümsek | Doç. Dr. Musa Şölener |  |  |
| **Signature** |  |  |  |  |

01/07/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**

**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Chemical Process Calculation | 151613556 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 4 | 0 | 4 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 4 |  |  |  |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | Introducing the concepts of reaction stoichiometry and making their calculations, applying mass-energy balances in steady state physical and chemical processes, solving flue gas problems, reading the data required for enthalpy calculation from thermodynamic tables and demonstrating the use of moisture diagrams. |
| **Course Description** | Basic concepts, chemical equations and stoichiometry, mass balances, combustion reactions, gas-vapor mixtures, enthalpy, energy balances in physical processes, energy balances in chemical processes, use of mass and energy balances together. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Makes stoichiometric calculations. | 1c | 1, 5, 6 | A, B |
| **2** | Establishes mass balance in open systems of steady-state physical and chemical processes | 1c | 1, 5, 6 | A, B |
| **3** | Establishes energy balance in open systems of steady-state physical and chemical processes | 1c | 1, 5, 6 | A, B |
| **4** | Performs flue gas analysis and finds fuel composition based on flue gas analysis | 1c, 11 | 1, 5, 6 | A, B |
| **5** | Finds physical properties of gas vapor systems and uses moisture diagrams | 1c | 1, 5, 6 | A, B |
| **6** | Uses mass and energy balances together to solve problems. | 1c, 6b | 1, 5, 6, 12 | A, B |
| **7** |  |  |  |  |
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| **Textbook** | İnel, O., Aşkın, A., “Kimya Mühendisliğinde Kütle ve Enerji Denklikleri”, Osmangazi Üniversitesi Mühendislik Mimarlık Fakültesi Kimya Mühendisliği Bölümü, Yayın No:53, 2000. |
| **Other References** | * Atalay, F.S., 2015, Kimyasal Süreçlerde Çözümlü Problemlerle Kütle ve Enerji Denklikleri, Nobel Akademik Yayıncılık. * Felder, R. M., Rousseau, R. W., Elementary Principles of Chemical Processes, 3rd ed., John Wiley & Sons, New York, 2005. * Himmelblau, D. M. , Riggs J. B., 2014, Kimya Mühendisliğinde Temel İlkeler ve Hesaplamalar Nobel Akademik Yayıncılık, Çeviri Editörü: Saffettin Ferda Mutlu. |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Basic concepts |
| **2** | Chemical Equations and Stoichiometry |
| **3** | Mass Balances |
| **4** | Mass Balances |
| **5** | Combustion Reactions |
| **6** | Combustion Reactions |
| **7** | Gas-Vapor Mixtures |
| **8** | **MIDTERM** |
| **9** | Gas-Vapor Mixtures |
| **10** | Gas-Vapor Mixtures |
| **11** | Energy Balances in Physical Processes |
| **12** | Energy Balances in Chemical Processes |
| **13** | Energy Balances in Chemical Processes |
| **14** | Combined Applications of Mass and Energy Balances |
| **15** | Combined Applications of Mass and Energy Balances |
| **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 | 4 | 5 | 20 |
| Quiz preparation | 4 | 8 | 32 |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
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|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 18 | 18 |
|  | **Total workload** | | **184** |
|  | **Total workload / 30** | | **6.13** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | 25 |
| Homework |  |
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| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **NO** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Ayşegül Aşkın | Doç. Dr. Belgin Karabacakoğlu |  |  |
| **Signature** |  |  |  |  |

10/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu****ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Occupational Health and Safety I | 151613564 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 2 | 0 | 2 | 3 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 1 |  | 1 |  |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To teach the methods of prevention of occupational accidents and diseases in the workplace. |
| **Course Description** | Definition of occupational safety, its importance, occupational safety culture, occupational accidents, occupational diseases, factors affecting the work environment, basic occupational safety in workplaces, risk assessment, personal protectors, fire, emergency plan in workplaces, legislation on occupational health and safety. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of occupational health and safety, work accidents and occupational diseases. | 1c, 6b, 11 | 1, 12 | A,D |
| **2** | Defines the risk factors and basic security measures affecting the workplace environment. | 1c, 6b, 11 | 1, 12 | A,D |
| **3** | Explains risk assessment. | 1c, 6b | 1, 12 | A,D |
| **4** | Explains personal protectors and their importance. | 1c, 6b | 1, 12 | A,D |
| **5** | Defines fire and fire precautions. | 1c, 6b | 1, 12 | A,D |
| **6** | Evaluates laws and regulations regarding occupational health and safety. | 1c, 6b, 9b | 1, 12 | A,D |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | 1. Kahya, E. ve Özkar, D., 2018, İş Güvenliği, Dorlion Yayınları, Eskişehir. |
| **Other 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*,*  TMMOB/MMO Yayın No:MMO/363/2, Ankara. |
| **Tools and Equipment Required** | Computer and projector |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Course scope, execution, evaluation, general information on Occupational Safety |
| **2** | Occupational Safety culture |
| **3** | Work Accidents (Factors, types, performance criteria) |
| **4** | İş Kazaları (Oluşum teorileri, istatistikler, soruşturmalar) |
| **5** | Occupational diseases |
| **6** | Workplace risk factors |
| **7** | Workplace risk factors |
| **8** | **MIDTERM** |
| **9** | Basic safety measures in workplaces |
| **10** | Risk assessment |
| **11** | Risk assessment |
| **12** | Personal protective equipment |
| **13** | Fire |
| **14** | Fire |
| **15** | Emergency Plan and Relevant Regulation in Workplaces |
| **16, 17** | **FİNAL EXAM** |

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| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | 1 | 20 | 20 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 6 | 6 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 6 | 6 |
|  | **Total workload** | | 90 |
|  | **Total workload / 30** | | 3 |
|  | **Course ECTS Credits** | | 3 |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Quiz | **-** |
| Homework | 20 |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering | 1 |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Belgin KARABACAOĞLU | Dr.Öğr. Üyesi Uğur SELENGİL |  |  |
| **Signature** |  |  |  |  |

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Business and Entrepreneurship | 151613558 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3 | 2 | 0 | 2 | 3 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  | 2 |  |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To encourage students towards entrepreneurship, to teach them how to follow a path when making an investment, to explain the concept of business. |
| **Course Description** | Departmentation of Businesses and Purposes of Businesses, Formation of Investment Decision Regarding the Establishment of Businesses and Determination of the Place of Establishment of Businesses, Legal Structure of Businesses, Size and Capacity in Businesses, Integration and Collaborations in Businesses, Management and Organization Function in Businesses, Basic Concepts and Macro Functions of Marketing in Businesses, Micro Functions of Marketing in Businesses, Production Function in Businesses, Fundamentals of Financial Management, Capital Resources of Businesses and Risk in Business Management, Meaning and Organizational Position of Personnel Management, Functions of Personnel Management.  The course includes the definition, importance and characteristics of entrepreneurship, what steps should be followed before investing, the economic, technical and financial evaluation of the investment and how to choose among alternatives. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Recognizes the division and purposes of businesses. | 10b | 1 | A |
| **2** | Explains issues related to investment decisions regarding businesses, determination of the location of establishment, legal structure, size and capacity of businesses. | 10b | 1 | A |
| **3** | Explains integration and collaboration, management and organization functions in businesses. | 10b | 1 | A |
| **4** | Recognizes the macro-micro functions of marketing in businesses and explains the production function. | 10b | 1 | A |
| **5** | Realizes the meaning and importance of risk and personnel management in businesses, explains the organizational position and defines the functions of personnel management. | 10b | 1 | A |
| **6** | Explains the definition, importance and characteristics of entrepreneurship, what steps should be followed before investing, how to evaluate the investment in terms of economic, technical and financial aspects and how to choose among alternatives. | 10b | 1 | A |

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| **Textbook** | 1.Dinçer, Ö., “İşletme Bilimine Giriş”,  2.Erdoğan, B.Z., “Girişimcilik ve KOBİ ler” |
| **Other References** | Komisyon, “İşletme Bilimine Giriş”, Açıköğretim Yayınları. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Entrepreneurship |
| **2** | Business plan analysis |
| **3** | Market research |
| **4** | Capacity selection |
| **5** | Selection of establishment location |
| **6** | Technology selection |
| **7** | Determining workforce needs |
| **8** | **MIDTERM** |
| **9** | Calculation of production costs |
| **10** | Determination of working capital needs |
| **11** | Evaluation of investment projects |
| **12** | Evaluation of investment projects in terms of national economy |
| **13** | Intellectual and Industrial Rights |
| **14** | Entrepreneurship and SMEs in Turkey |
| **15** | Entrepreneurship and SMEs in Turkey |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| 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** | | **86** |
|  | **Total workload / 30** | | **2.87** |
|  | **Course ECTS Credits** | | **3** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation | 5 |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Organic Chemistry | 151614555 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 4 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 3 | - | - | - | - |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To ensure that students learn the basic topics and concepts of organic chemistry and to enable them to better understand organic processes in chemical technologies. |
| **Course Description** | Introduction to Organic Chemistry, Chemical Bonds, Alkanes, Cycloalkanes, Alkenes, Alkynes, Dienes and Polymerization, Aromatic Hydrocarbons, Alkyl Halides, Alcohols, Ethers, Phenols, Aromatic Compounds. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Recognizes and classifies organic molecules. | 1b | 1, 2, 5 | A |
| **2** | Knows the usage areas of organic molecules and their place in chemical technologies. | 1b | 1, 2, 5 | A |
| **3** | Writes the reactions of organic substances with other substances. | 1b | 1, 2, 5 | A |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | T.W G. Solomons (2002) Organik Kimya Çev. Edit Gürol Okay-Yılmaz Yıldırır, Literatür Yayıncılık |
| **Other References** | Hart,Craine,Hart, Ceviri Editörü, “Organik Kimya”, Palme Yayıncılık,2000 |
| **Tools and Equipment Required** | Computer and Projector |

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| **COURSE SYLLABUS** | |
| **1** | Carbon Compounds and Chemical Bonds |
| **2** | Functional groups and their nomenclature |
| **3** | Alkanes: Introduction to nomenclature, conformations, and syntheses |
| **4** | Ionic Reactions - Nucleophilic Substitution Reactions of Alkyl Halides |
| **5** | SN1 and SN2 reactions |
| **6** | Alkenes and Alkynes I: Properties and preparation |
| **7** | Alkenes and Alkynes I: E1 and E2 reactions |
| **8** | **MIDTERM** |
| **9** | Alkenes and Alkynes II: Addition reactions to alkenes |
| **10** | Alkenes and Alkynes II: Addition reactions to alkynes |
| **11** | Structure, nomenclature and reactions of alcohols |
| **12** | Structure, nomenclature and reactions of ethers |
| **13** | Reactions to obtain alcohols and ethers |
| **14** | Aromatic Compounds |
| **15** | Reactions of Aromatic Compounds |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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) |  |  |  |
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| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 30 | 30 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 30 | 30 |
|  | **Total workload** | | **118** |
|  | **Total workload / 30** | | **3.93** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 50 |
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| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

10/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Numerical Methods in Engineering | 151614240 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 4 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 | 2 |  |  |  |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To teach the numerical methods for solving the problems that cannot be solved by using analytical methods, and the algorithms of these methods, to write the algorithms in a programing language or to solve them by using a package program |
| **Course Description** | Basic principles of numerical methods used in the solution of engineering problems; solutions of linear equation systems, nonlinear equations and ordinary differential equations; interpolation; numerical differentiation and integration; curve fitting |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Calculate the approximation and the numerical error. | 1a, 1c | 1, 10 | A, D |
| **2** | Solve the linear equation systems and the nonlinear equations. | 1a, 1c | 1, 10 | A, D |
| **3** | Use the interpolation methods. | 1a, 1c | 1, 10 | A, D |
| **4** | Apply the numerical differentiation and integration methods. | 1a, 1c | 1, 10 | A, D |
| **5** | Derive functions fitting the data. | 1a, 1c | 1, 10 | A, D |
| **6** | Solve the ordinary differential equations numerically. | 1a, 1c | 1, 10 | A, D |
| **7** | Prepares the homework. | 1a, 1c, 4b, 6b | 12, 15 | D |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Chapra, S.C., Canale, R.P., (Çeviri: H. Heperkan, U. Kesgin), “Yazılım ve Programlama Uygulamalarıyla Mühendisler İçin Sayısal Yöntemler”, Literatür Yayıncılık, İstanbul, 2003. |
| **Other References** | 1. Türker, E.S., Can, E., “Bilgisayar Uygulamalı Sayısal Analiz Yöntemleri”, 2. baskı, Değişim Yayınları, Adapazarı, 1997.  2. Karris, S.T., “Numerical Analysis Using Matlab and Excel”, 3rd edition, Orchard Publications, California, 2007.  3. Yang W.Y., Cao, W., Chung, T.S., Morris, J., “Applied Numerical Methods Using Matlab”, John Wiley&Sons, Inc., New Jersey, 2005. |
| **Tools and Equipment Required** | Calculator, computer, projector, classroom with curtains. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, explanation of the purpose and content of the course |
| **2** | Approaches and errors |
| **3** | Approaches and errors |
| **4** | Solution of nonlinear equations |
| **5** | Solution of nonlinear equations |
| **6** | Interpolation |
| **7** | Numerical derivative |
| **8** | **MIDTERM** |
| **9** | Numerical integral |
| **10** | Numerical integral |
| **11** | Curve fitting to data |
| **12** | Numerical solutions of ordinary differential equations |
| **13** | Numerical solutions of ordinary differential equations |
| **14** | Solution of systems of linear equations |
| **15** | Solution of systems of linear equations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 15 | 15 |
| 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 | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **111** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credits** | | **4** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 15 |
|  |  |
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|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 5 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. İlker KIPÇAK | Doç. Dr. Ceyda BİLGİÇ |  |  |
| **Signature** |  |  |  |  |

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| History of Turkish Revolution and Principles of Kemal Atatürk II | 151614552 |

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

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | - | 2 |

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

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| --- | --- |
| **Prerequieite(s)** | None |
| **Course Objectives** | To provide historical awareness and to ensure that the basic principles on which our Republic is based are necessary for individual and social freedom. |
| **Course Description** | The emergence of the Republic of Türkiye in historical context and the basic principles on which it is based.. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Becomes aware of history and its importance. | 6a, 8 | 1 | A |
| **2** | Explains the environment before the establishment of the Republic of Türkiye. | 6a, 8 | 1 | A |
| **3** | Realizes that the fundamental principles on which our Republic is based are necessary for individual and social freedom. | 6a, 8 | 1 | A |
| **4** | Explains the basic principles of the Republic of Türkiye. | 6a, 8 | 1 | A |
| **5** |  |  |  |  |

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| **Textbook** | M. Derviş Kılıçkaya (ed.), “Atatürk ve Türkiye Cumhuriyeti Tarihi”, Ankara, 2005. |
| **Other References** | Atatürk, “Nutuk I-II”, Türk Tarih Kurumu Yayını, Ankara. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Armistice of Mudros and Turkey during the Armistice Period, Istanbul after the Armistice, Patriotic Parties and Societies in Istanbul. |
| **2** | Parties and Institutions Against the War of Independence, Societies Established by Minorities, National Societies Established for the Purpose of Fighting the Enemy, Mustafa Kemal's Arrival in Istanbul and His Activities in Istanbul. |
| **3** | Sending Mustafa Kemal Pasha to Anatolia as an Army Inspector and Landing in Samsun on May 19, 1919, Greek Occupation of Izmir and Reactions, Kuvay-ı Milliye, Mustafa Kemal's Activities in Samsun and Its Surroundings. |
| **4** | Amasya Circular, Erzurum Congress. Balıkesir and Alaşehir Congresses and the Formation of the National Front Against the Greeks, Sivas Congress and its Results. |
| **5** | The Fall of Damat Ferit Pasha's Government, the Relations between the Ali Rıza Pasha Government and the Representative Committee and the Amasya Meetings, the Last Ottoman Parliament and the National Pact Decisions, the Opening of the Turkish Grand National Assembly. |
| **6** | The Structure of the Turkish Grand National Assembly, the Formation of the Turkish Grand National Assembly and its Handling of Management. Rebellions Supported by the Istanbul Government Against the Grand National Assembly of Turkey and its Government and the National Police Movement, the Greek Operation and the Signing of the Treaty of Sèvres. |
| **7** | Gediz Offensive and the Establishment of Regular Armies, Ankara-Moscow Relations and the Eastern Front. The First Battle of İnönü and Political Developments, “The Constitution of the Essential Organization”, London Conference, Treaty of Moscow. |
| **8** | **MIDTERM** |
| **9** | II. Battles of İnönü and Its Political Effects, New Greek General Offensive, Mustafa Kemal's Election as Commander-in-Chief and Tekalif-i Milliye Decisions, Sakarya Square Battle. |
| **10** | Great Offensive Operation, Mudanya Armistice and Its Implementation, Lausanne Conference and Peace Treaty. (Midterm) |
| **11** | Turkish Domestic Policy during the Ataturk Era, Ankara Becoming the Capital, Proclamation of the Republic, Abolition of the Caliphate, Establishment of the Progressive Republican Party and Sheikh Sait Rebellion- Izmir Assassination Attempt, Establishment of the Free Republican Party and the Menemen Incident. |
| **12** | Foreign Policy of the Ataturk Era, Population Population Exchange Problem, Mosul Problem, Balkan Pact, Montreux Straits Convention, Sadabat Pact, Hatay Problem, Revolutionary Movements: Actions in the Fields of Law, Education, Culture, Economy and Social Affairs |
| **13** | Ataturk's Principles: Republicanism, Nationalism, Populism, Secularism, Statism, Revolutionism |
| **14** | Ataturk's Principles: Republicanism, Nationalism, Populism, Secularism, Statism, Revolutionism |
| **15** | Ataturk's Principles: Republicanism, Nationalism, Populism, Secularism, Statism, Revolutionism |
| **16,17** | **FINAM EXAM** |

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| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 2 | 2 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 2 | 2 |
|  | **Total workload** | | **48** |
|  | **Total workload / 30** | | **1.6** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | % |
| Midterm | 40 |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| skill of developing, selecting and applying the required techniques and devices |  |
| skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 5 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Analytical Chemistry Laboratory | 151614553 |

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

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 2 |  |  |  |  |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To introduce analytical chemistry techniques. To teach experimental studies of qualitative and quantitative analysis. To improve laboratory activities in obtaining analytical data. |
| **Course Description** | Cation and anion analyses, gravimetric analysis, titrations of strong acids and bases, titrations of weak acids and bases, complexometric titrations. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Classifies cations, recognizes and orders cations in each group. | 1b | 3 | B |
| **2** | Classifies anions, recognizes and sorts the anions in each group. | 1b | 3 | B |
| **3** | Analyzes and evaluates the sample containing various cations and predicts the results. | 5b, 6a | 3 | E |
| **4** | Analyzes and evaluates the sample containing various anions and predicts the results. | 5b, 6a | 3 | E |
| **5** | Analyzes samples by applying the gravimetric analysis method. | 1b, 5b, 6a | 3 | B, E |
| **6** | Prepares and adjusts standard solutions for the titrimetric method and measures their concentrations. | 1b,5b, 6a | 3 | B, E |
| **7** | Performs titrations of strong acids and bases. | 5b, 6a | 3 | B, E |
| **8** | Performs titrations of weak acids and bases. | 5b, 6a | 3 | B, E |
| **9** | Uses the complexometric titration method. | 5b, 6a | 3 | B, E |
| **10** |  |  |  |  |

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| **Textbook** | 1. Gedikbey, T., Tunalı, S., Birlik, E., Güray, T., “Kalitatif Analiz Laboratuvar Kitabı”, 2. Baskı, Osmangazi Üniversitesi Yayınları, Yayın No: 100, 2009.  2. Gedikbey, T., Tunalı, S., Birlik, E., Güray, T., “Kantitatif Analiz Laboratuvar Kitabı”, 2. Baskı, Osmangazi Üniversitesi Yayınları, Yayın No: 101, 2009. |
| **Other References** | 1. Gündüz, T., “Kantitatif Analiz Laboratuvar Kitabı”, 5. Baskı, Bilge Yayıncılık, 1993. 2. Gündüz, T., “Yarı-Mikro Kalitatif Analiz ”, 7. Baskı, Gazi Büro Kitabevi, 1999. |
| **Tools and Equipment Required** | Gloves, protective glasses, mask, laboratory coat, test tubes, beaker, conical flask, glass dropper, spatula, forceps, cleaning materials (tube brush, detergent, cloth, etc.) |

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| **COURSE SYLLABUS** | |
| **1** | Making announcements and explanations about the laboratory |
| **2** | Laboratory Safety training |
| **3** | Analysis of Group I Cations |
| **4** | Analysis of Group III Cations |
| **5** | Analysis of Group IV and V Cations |
| **6** | Anion Analysis |
| **7** | Gravimetric iron determination |
| **8** | **MIDTERM** |
| **9** | Preparation and adjustment of 0.1 N HCl and 0.1 N NaOH solutions |
| **10** | Determination of NaOH with 0.1N HCl solution; Analysis of Na2CO3 and NaHCO3 mixture with 0.1N HCl solution |
| **11** | Determination of acetic acid with 0.1N NaOH solution; Determination of boric acid with 0.1N NaOH solution |
| **12** | Complexometric titrations (calcium, magnesium and zinc determinations with EDTA) |
| **13** | Separations (Calcium-magnesium separation) |
| **14** | Make-up Experiments |
| **15** | Make-up Experiments |
| **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 | 2 | 28 |
| Homework |  |  |  |
| Quiz | 4 | 0,5 | 2 |
| Quiz preparation | 4 | 4 | 16 |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 14 | 1 | 14 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | | **116** |
|  | **Total workload / 30** | | **3.87** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm |  |
| Quiz | 50 |
| Report | 50 |
|  |  |
|  |  |
| **Semester final exam** |  |
| **Semester activities** | **Semester activities** |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 4 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| skill of developing, selecting and applying the required techniques and devices |  |
| skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 5 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Fatma Tümsek | Doç. Dr. Musa Şölener |  |  |
| **Signature** |  |  |  |  |

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Thermodynamics I | 151614554 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 4 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | It is aimed to apply the basic principles of thermodynamics, the first and second laws of thermodynamics to closed and open systems, to emphasize the importance of the concept of entropy in engineering applications, to give general methods in deriving thermodynamic property relations, to use the principles of mass and energy conservation in systems with chemical reactions, and to give the basic principles of chemical and phase equilibrium. |
| **Course Description** | Basic concepts of thermodynamics, first law of thermodynamics: closed systems, open systems; second law of thermodynamics, entropy; thermodynamic property relations; chemical reactions; chemical equilibrium and phase equilibrium |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1.** | Recognizes the importance and application areas of thermodynamics. | 1c | 1,6 | A,B |
| **2** | Applies this equation to closed systems by defining the principles on which the first law of thermodynamics is based. | 1c, 1d, 6b | 1,6, 12 | A,B,D |
| **3** | Solve problems by defining isothermal and adiabatic processes. | 1c, 1d, 6b | 1,6,12 | A,B,D |
| **4** | Solve problems by defining the second law of thermodynamics. | 1c, 1d, 6b | 1,6,12 | A,B,D |
| **5** | Solves the problem by defining heat engine, refrigeration machine and heat pump. | 1c, 1d, 6b | 1,6,12 | A,B,D |
| **6** | Explains the Carnot cycle and its principles. | 1c, 1d, 6b | 1,6, 12 | A,B,D |
| **7** | Defines entropy, calculates entropy in reversible and irreversible systems. | 1c, 1d, 6b | 1,6, 12 | A,B,D |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** | . |  |  |  |

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| **Textbook** | Çengel, Y., Boles, M. A. (Çeviri: Derbentli, T.), “Mühendislik Yaklaşımıyla Termodinamik”, Literatür Yayıncılık, İstanbul, 1996. |
| **Other References** | 1. Smith J.M., Van Ness H.C., Introduction to Chemical Engineering Thermodynamics, Boston : McGraw-Gill, 2001., 789 s.  2. Gürüz K., “Kimya Mühendisliği Termodinamiği”, Ankara Üniversitesi Yayınları, Ankara 1986.  3. Öztürk, A., Kılıç, A., “Çözümlü Problemlerle Termodinamik”, Çağlayan Kitabevi, 3. Baskı, İstanbul, 1993. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Basic Concepts of Thermodynamics |
| **2** | Basic Concepts of Thermodynamics |
| **3** | First Law of Thermodynamics |
| **4** | First Law of Thermodynamics: Closed Systems |
| **5** | First Law of Thermodynamics: Open Systems |
| **6** | Second Law of Thermodynamics: Heat - Cooling Machines, Heat Pumps, Carnot Cycle |
| **7** | Second Law of Thermodynamics: Entropy |
| **8** | **MIDTERM** |
| **9** | Second Law of Thermodynamics: Entropy |
| **10** | Application of Entropy to Open and Closed Systems |
| **11** | Thermodynamic Property Relations |
| **12** | Thermodynamic Property Relations |
| **13** | Chemical Reactions |
| **14** | Chemical Equilibrium and Phase Equilibrium |
| **15** | Chemical Equilibrium and Phase Equilibrium |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 5 | 2 | 10 |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 5 | 10 |
| 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 | 1 | 15 | 15 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 17 | 17 |
|  | **Total workload** | | **120** |
|  | **Total workload / 30** | | **4** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Exam | 35 |
| Quiz | 10 |
| Homework | 10 |
|  |  |
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| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 5 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Sait Yorgun | Prof. Dr. Hakan Demiral |  |  |
| **Signature** |  |  |  |  |

15/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Fluids Mechanics | 151614556 |

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| **Semester** | **Weekly Course Period** | | **Theory** | **Practice** |
| **Theory** | **Practice** |
| 4 | 4 | 0 | 4 | 6 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | 1 | - | - |

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

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| **Prerequieite(s)** | Differential equations. |
| **Course Objectives** | Teaching the theoretical foundations of momentum transfer as well as flow types such as layered and turbulent flow; giving the definition and usage of friction coefficients, learning the approach with large-scale equations; In addition to introducing the flow of polymers and fluidized beds, it also teaches applications in chemical engineering through numerous problem solving. |
| **Course Description** | Fundamentals of momentum transfer; viscosity and calculation methods; velocity distributions in layered flow; exchange equations for isothermal systems; velocity distributions in turbulent flow; inter-phase momentum transfer and friction coefficients; equivalences on a large scale; mechanical energy balance and Bernoulli equation; flow of polymers; fluidized beds. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines and classifies fluids. | 1c | 1,8 | A,D |
| **2** | Defines and calculates viscosity. | 1c | 1,8 | A,D |
| **3** | Finds expression in velocity distribution in layered flow. | 1c | 1,8 | A,D |
| **4** | Solves fluid mechanics problems on small and large scales | 1c | 1,8 | A,D |
| **5** | Defines fixed and fluidized beds and solves their problems. | 1c | 1,8 | A,D |
| **6** | Designs and presents pipelines in its projects. | 1c, 3, 6b, 7a | 10, 12, 14, 15 | E,G |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Bird, R. B., Stewart, W. E., and Lightfoot, E. N., “Transport Phenomena”, 2nd edition, John Wiley, New York, 2002. (Bu kitabın çevirisi de bulunmaktadır.) |
| **Other References** | 1. Peker, S., Helvacı, Ş. Ş., “Akışkanlar Mekaniği: Kavramlar, Problemler, Uygulamalar”, Literatür Yayıncılık, İstanbul, 2003.  2. Uysal, B. Z., “Akışkanlar Mekaniği”, Alp Yayınları, 2003.  3. McCabe, W. L., Smith, J. C., Harriot, J. C., “Unit Operations of Chemical Engineering”, 7th edition., McGraw Hill, New York, 2005. |
| **Tools and Equipment Required** | Projector, Computer |

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| **COURSE SYLLABUS** | |
| **1** | Introduction of the Course and its Purpose, Definition of Fluid, Compressible and Incompressible Fluids |
| **2** | Newton's Viscosity Law, Predicting Viscosity Using Various Methods |
| **3** | Shell Momentum Balance and Solution of Laminar Flow Problems. |
| **4** | Solution of Laminar Flow Problems. |
| **5** | The Equation of Continuity, The Equation of Motion, The Equation of Mechanical Energy, Solution of Laminar Flow Problems at Steady State Using Equations of Change. |
| **6** | Solution of Steady-State Layered Flow Problems with Continuity and Motion Equations |
| **7** | Dimensional Analysis of Equations of Change and Applications, Homework Presentation |
| **8** | **MIDTERM** |
| **9** | Solution of Laminar Flow Problems at Unsteady State. |
| **10** | Fluctuations in Turbulent Flow and The Time-Smoothed Quantities, Reynolds Stresses, Determination of the Velocity Profile in a Tube. |
| **11** | Definition of Friction Factors, Friction Factors for Flow in Tubes |
| **12** | Friction Coefficients for Flow Around Submerged Bodies and Flow in Packed Towers |
| **13** | Mass Balance on a Large Scale, Motion Balance, Mechanical Energy Balance (Bernoulli Equation); Calculation of Friction Loss |
| **14** | Fluidized Bed Equations for Fluidization and Design |
| **15** | Homework and Project Presentation |
| **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 | 2 | 28 |
| Homework | 2 | 19 | 38 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 20 | 20 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **176** |
|  | **Total workload / 30** | | **5.87** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 15 |
| Project | 10 |
|  |  |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. | 1 |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof.Dr.Neşe Öztürk | Prof.Dr.Demet Topaloğlu Yazıcı |  |  |
| **Signature** |  |  |  |  |

8/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu****ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Occupational Health and Safety II | 151614560 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Semester** | **Semester** |
| **Theory** | **Practice** |
| 4 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 1 |  | 1 |  |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To teach the risks in the areas related to the chemical engineering and occupational diseases and accidents resulting from these risks to give awareness about the related regulations; to give awareness of occupational health, safety and environmental considerations. |
| **Course Description** | Introduction; Health, Safety, environment (HSE), Chemical risk factors; Health and safety impacts of chemicals and related regulations; Industrial Accidents; Classification and labelling the chemicals, Safety Information Forms (MSDS), Laboratory safety, laboratory accidents and related measures; first aid in laboratory accidents; Air, water and soil pollution and related regulations, waste management. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains Health, Safety, Environment (HSE) management and triple responsibility | 1c, 9b, 11 | 1 | A |
| **2** | Chemical risk factors; Explains the health and safety effects of chemicals and the precautions to be taken. | 1c, 9b, 11 | 1 | A |
| **3** | Evaluates regulations regarding explosion, dangers of explosive atmospheres and prevention of major industrial accidents. | 1c, 9b, 11 | 1 | A |
| **4** | Explains the classification, labeling and packaging of chemical substances, Safety data sheets and related issues. | 1c, 9b, 11 | 1 | A |
| **5** | Explains laboratory safety, accidents and precautions that can be taken. | 1c, 9b, 11 | 1 | A |
| **6** | Explains the environmental effects of chemicals (air, water and soil pollution); Evaluates waste management and legal regulations. | 1c, 9b, 10c, 11 | 1 | A |
| **7** | Environmental sustainability; Explains Sustainable Development (goals, targets, indicators), Zero Waste, and Zero Waste Regulation. | 1c, 9b, 10c, 11 | 1 | A |
| **8** |  |  |  |  |

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| **Textbook** | 1.İSGÜM ve Çevre ve Şehircilik Bakanlığı web sayfasında yer alan konu ile ilgili dersin kısa içeriğinde sayılan yönetmelikler,  2. Kimya sektörü işyerlerinde iş sağlığı ve güvenliği rehberi, Ankara: Çalışma ve Sosyal Güvenlik Bakanlığı İş Teftiş Kurulu Başkanlığı, 2009.  3. Çınar, Ö. Çevre Kirliliği ve Kontrolü, Nobel Yayıncılık, 2013. |
| **Other References** | 1. Crowl, D.A. and Louvar, J.F., Chemical Process Safety Fundamentals with Applications, Prentice Hall, 2002.  2. Kahya, E., Özkar, D., İş Güvenliği, ESOGÜ, 2018. |
| **Tools and Equipment Required** | Computer and projector. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, Health, safety, environment (HSE) |
| **2** | Chemical risk factors |
| **3** | Regulation on Health and Safety Measures in Working with Chemical Substances |
| **4** | Health effects of chemical substances Regulation on Health and Safety Precautions in Working with Carcinogenic or Mutagenic Substances |
| **5** | Safety effects of Chemical Substances; Regulation on the Protection of Employees from the Dangers of Explosive Atmospheres, Regulation on Fire Protection of Buildings |
| **6** | Industrial accidents, Regulation on Prevention of Major Industrial Accidents and Reducing Their Effects |
| **7** | Safety Data Sheets (SDS), Regulation on the Preparation and Distribution of Safety Data Sheets for Hazardous Substances and Preparations; Classification and labeling of chemical substances, Regulation on Classification, Labeling and Packaging of Substances and Mixtures (SEA); Health and Safety Signs Regulation |
| **8** | **MIDTERM** |
| **9** | Laboratory Safety |
| **10** | Laboratory accidents and precautions, First aid in laboratory accidents |
| **11** | Environmental effects of chemicals; Air pollution |
| **12** | Environmental effects of chemicals; Water pollution |
| **13** | Environmental effects of chemicals; soil pollution |
| **14** | Waste management and legal regulations. |
| **15** | Sustainability and environment; Sustainable Development (goals, targets, indicators), Zero Waste, Zero Waste Regulation. |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 20 | 20 |
| Semester final exam | 1 | 1 | 1 |
| Semester final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **82** |
|  | **Total workload / 30** | | **2.7** |
|  | **Course ECTS Credits** | | **3** |
| **Assessment** | | | |
| **Semester activities** | **%** | | |
| Midterm | 50 | | |
| Homework | - | | |
|  |  | | |
| **Semester final exam** | 50 | | |
| **Total** | 100 | | |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering | 5 |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development | 3 |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 5 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Belgin KARABACAKOĞLU | Dr.Öğr.Üyesi Uğur SELENGİL |  |  |
| **Signature** |  |  |  |  |

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Quality Management | 151614558 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 4 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  | 1 | 1 |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To introduce quality, quality management, quality standards and to emphasize the benefits it will provide in businesses and to make people understand the importance and benefits of the total quality management approach. |
| **Course Description** | Basic concepts related to quality, the concept of quality in businesses and the historical development of quality, an overview of quality management and management quality, the adoption of quality management and total quality management in businesses, the role of the ISO 9000 quality assurance system in ensuring the effectiveness of the quality management system. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1.** | Makes definitions of quality. | 8,11 | 1,2,5 | A |
| **2** | Understands the differences between quality approaches. | 8,11 | 1,2,5 | A,D |
| **3** | Explains the basic concepts in quality management. | 8,11 | 1,2,5 | A,D |
| **4** | Explains the importance of total quality management. | 6a,6b,11 | 1,2,5 | A,D |
| **5** | Ability to define quality assurance system and total quality management models. | 6a,6b,11 | 1,2,5 | A,D |
| **6** | Realizes the necessity of quality management. | 9a,11 | 1,2,5 | A,D |
| **7** | Explains the benefits of quality management in businesses. | 8,11 | 1,2,5 | A,D |
| **8** | Examines quality management systems. | 10a, 10b,10c,11 | 1,2,5 | A,D |
| **9** | Applies ISO 9000 Quality management system standard. | 9b, 11 | 1,2,5 | A,D |
| **10** |  |  |  |  |

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| **Textbook** | Efil, İ.,” Toplam Kalite Yönetimi ve ISO 9000 Kalite Güvence Sistemi “, Alfa Yayınları, 1999. |
| **Other References** | 1. Burnak , N., “Toplam Kalite Yönetimi “, Osmangazi Üniversitesi, Eskişehir, 1992. 2. Bozkurt, R., Odaman ,A., “ ISO 9000 Kalite Güvence Sistemleri “, MPM, Yayın No, 549, Ankara, 1985. 3. Peşkircioğlu, N., “ Kalite Yönetiminde ISO 9000 Uygulamaları “, MPM Yayın No 620, Ankara, 1999. |
| **Tools and Equipment Required** | - Computer, Projector. |

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| **COURSE SYLLABUS** | |
| **1** | Basic Concepts about Quality |
| **2** | Basic Concepts about Quality |
| **3** | The Concept of Quality and Development of Quality in Businesses |
| **4** | The Concept of Quality and Development of Quality in Businesses |
| **5** | Quality management |
| **6** | Quality management |
| **7** | Quality of Management |
| **8** | **MIDTERM** |
| **9** | Quality of Management |
| **10** | Total quality Management |
| **11** | Total quality Management |
| **12** | The Role of ISO 9000 Standards in Ensuring the Effectiveness of the Quality Management System |
| **13** | The Role of ISO 9000 Standards in Ensuring the Effectiveness of the Quality Management System |
| **14** | Presenting the Projects Prepared for the Quality Management Course in the Classroom Environment |
| **15** | Presenting the Projects Prepared for the Quality Management Course in the Classroom Environment |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | 1 | 6 | 6 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) | 1 | 15 | 15 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 5 | 5 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 4 | 4 |
|  | **Total workload** | | **90** |
|  | **Total workload / 30** | | **3** |
|  | **Course ECTS Credits** | | **3** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Mıdterm | 40 |
| Quiz | - |
| Homework | 10 |
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| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 2 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 2 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 5 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering | 1 |
| **10** | 1. Knowledge about project management, risk management and change management | 1 |
| 1. Awareness of the significance of entrepreneurship and innovation | 1 |
| 1. Knowledge about sustainable development | 1 |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 5 |

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

27/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Engineering Economics | 151615419 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 3 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution))** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| --- | --- |
| **Prerequieite(s)** | None |
| **Course Objectives** | To explain the cost items of an industrial plant and the cost estimation methods; to teach the financial analysis, the methods of determining the profitability of capital investment and the methods of comparing investment options. |
| **Course Description** | Cost estimation, interest and interest types, depreciation and depreciation types, financing of investment projects and financial analysis, the profitability of capital investment, alternative investments. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Calculate the fixed capital investment, the working capital, the total investment capital and the total product cost using the cost estimation methods. | 1c | 1, 6, 12, 14 | A, E, G |
| **2** | Makes interest and depreciation calculations. | 1c | 1, 6 | A |
| **3** | Conducts financial analysis using financing rates. | 1c | 1, 6 | A, E, G |
| **4** | Analyze the investment options using the profitability assessment methods. | 1c | 1, 6 | A, E, G |
| **5** | Works as a team, prepares and presents reports while preparing the cost and economic analysis project of a facility. | 1c, 4b, 6b, 8, 10b | 12, 14, 15 | E, G |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Peters, M.S., Timmerhaus, K.D., West, R.E., “Plant Design and Economics for Chemical Engineers”, McGraw Hill, New York, 2003. |
| **Other References** | 1. Tigrel, A., Alper, E., “Kimya Mühendisleri için Mühendislik Ekonomisi”, Petkim Petrokimya A.Ş., 1995. 2. Kahya, E., “Mühendislik Ekonomisi”, OGÜ Müh. Mim. Fak., Eskişehir,1999. 3. Okka, O., “Mühendislik Ekonomisi”, Nobel, Ankara, 2000. |
| **Tools and Equipment Required** | Computer, Projector |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Chemical Engineering Economics |
| **2** | Cost Estimates- Factors Affecting Investment and Production Costs |
| **3** | Cost Estimates – Total Capital Investment, Fixed Capital Investment, Working Capital |
| **4** | Cost estimation – Total product cost, manufacturing (operating) cost, general expenses |
| **5** | Cost estimation – Annual costs, profits and cash flows |
| **6** | Interest and interest types |
| **7** | Depreciation and depreciation types |
| **8** | **MIDTERM** |
| **9** | Financing of Investment Projects and Financial Analysis- Sources of Financing, Annual Report and statement of a company, important financing rates |
| **10** | Profitability of Capital Investments |
| **11** | Comparing Investment Options |
| **12** | Presentation of Feasibility Reports |
| **13** | Presentation of Feasibility Reports |
| **14** | Presentation of Feasibility Reports |
| **15** | Presentation of Feasibility Reports |
| **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) | 15 | 3 | 45 |
| Class Study time (revision, reinforcement, pre-study,….) | 15 | 2 | 30 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 35 | 35 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 15 | 15 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 17 | 17 |
|  | **Total workload** | | **146** |
|  | **Total workload / 30** | | **4.9** |
|  | **Course ECTS Credits** | | **5** |

|  |  |
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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Report | 15 |
| Presentation | 5 |
|  |  |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation | 1 |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

6/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Professional English I | 151615417 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 5 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | 2 | - |

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| --- | --- | --- |
| **Dersin Dili** | **Course Level** | **Course Type** |
| English | Undergraduate | Compulsory |

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To enrich the scientific and technical vocabulary of chemical engineering students and to enable them to learn, analyze and translate sentence structures in scientific articles into Turkish. |
| **Course Description** | English equivalents of terms in the field of chemistry and chemical engineering and translations from English texts related to this field. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Uses English grammar. | 7b | 1, 5 | A |
| **2** | Remembers the English equivalents of terms in the field of chemistry and chemical engineering. | 7b | 1, 5 | A |
| **3** | Analyzes sentence structures in texts in the field of chemistry and chemical engineering and translates them into Turkish. | 7b | 1, 5 | A |
| **4** | Aware of the necessity of foreign languages | 7b | 1 | A |
| **5** | - | - | - | - |
| **6** | - | - | - | - |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | Edis, P., “Teknik İngilizce”, İTÜ Vakfı Yayınları, No 2, 4, İstanbul, 1998 |
| **Other References** | 1. “Kimya ve Kimya Mühendisliği ve Çevre Terimleri Kılavuzu”, TMMOB Kimya Mühendisleri Odası, Ankara, 1997. 2. Kimya ve Kimya mühendisliği, İngilizce-Türkçe, Türkçe- İngilizce terimler sözlüğü, Prof. Dr. A. Rıza Berkem, Prof. Dr. Selahattin Gültekin, Türkiye Kimya Derneği yayınlar, İstanbul, 2005. 3. Kimya ve kimya mühendisliği ile ilgili tüm İngilizce metinler ( kitaplar, makaleler, internet kaynakları, vb.). |
| **Tools and Equipment Required** | English Dictionary |

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| **COURSE SYLLABUS** | |
| **1** | Introduction; Overall review of English Grammar |
| **2** | Introduction to English science terminology |
| **3** | Scientific terms in English |
| **4** | English chemistry terminology |
| **5** | English chemistry terminology |
| **6** | Considering the English terminology used in chemistry books and their use |
| **7** | Considering the English terminology used in chemistry books and their use |
| **8** | **MIDTERM** |
| **9** | Understanding the use of English in the main significant concepts of chemistry |
| **10** | Understanding the use of English in the main significant concepts of chemistry |
| **11** | Translation studies from English to Turkish in chemistry books and other literature sources |
| **12** | Translation studies from English to Turkish in chemistry books and other literature sources |
| **13** | Translation studies from English to Turkish in chemistry books and other literature sources |
| **14** | More detailed studies on chemistry texts and literature in English |
| **15** | More detailed studies on chemistry texts and literature in English and a general revision |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| 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 | 1 | 8 | 5 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 8 | 5 |
|  | **Total workload** | | 76 |
|  | **Total workload / 30** | | 2.53 |
|  | **Course ECTS Credits** | | 3 |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Uğur MORALI | Dr. Seda HOŞGÜN |  |  |
| **Signature** |  |  |  |  |

11/11/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Thermodynamics II | 151615401 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 3 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** | Thermodynamics I |
| **Course Objectives** | To give the basic principles of thermodynamics to students who have taken the Thermodynamics I course, the properties of pure substances, P-T-V relationships for gases and vapor (property) tables, and then to give the derivation and application of the general energy balance for steady state and unsteady state systems. Introducing the commonly used power and cooling cycles and examining them from a thermodynamic perspective. |
| **Course Description** | Properties of pure substances and P-V-T relationships; overall energy balance; entropy balance, steam power cycles, gaseous power cycles; cooling and gas liquefaction cycles. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1.** | Explains the properties of pure substances. | 1c | 1,6 | A,B |
| **2** | Recognizes the main continuous flow open systems used in engineering (such as turbines, pumps, nozzles, heat exchangers, valves, mixing chambers). | 1c, 1d | 1,6 | A,B |
| **3** | Recognizes unsteady state open systems | 1c, 1d | 1,6 | A,B |
| **4** | Establishes mass, energy and entropy balances in unsteady state open systems with continuous flow | 1c, 1d | 1,6 | A,B |
| **5** | Explains power cycles (steam and gas fluid) | 1c, 1d | 1,6 | A,B |
| **6** | Performs mass and energy analysis of power cycles | 1c, 1d | 1,6 | A,B |
| **7** | Solving problems on certain topics by working in groups | 1c, 1d, 6b | 12 | D |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Çengel, Y., Boles, M. A. (Çeviri: Derbentli, T.), “Mühendislik Yaklaşımıyla Termodinamik”, Literatür Yayıncılık, İstanbul, 1996. |
| **Other References** | 1. Smith J.M., Van Ness H.C., Introduction to Chemical Engineering Thermodynamics , Boston : McGraw-Gill, 2001., 789 s. 2. Gürüz K., “Kimya Mühendisliği Termodinamiği”, Ankara Üniversitesi Yayınları, Ankara 1986. 3. Öztürk, A., Kılıç, A., “Çözümlü Problemlerle Termodinamik”, Çağlayan Kitabevi, 3. Baskı, İstanbul, 1993. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Thermodynamics II and Basic Concepts |
| **2** | Properties of Pure Substances and P-V-T Relationships |
| **3** | Establishing and Analyzing General Energy Balance in Steady State Systems |
| **4** | Establishing and Analyzing General Energy Balance in Steady State Systems |
| **5** | Establishing and Analyzing General Energy Balance in Steady State Systems |
| **6** | Establishing and Solving General Energy Balance in Unsteady Systems |
| **7** | Establishing and Analyzing Entropy Energy Balance |
| **8** | **MIDTERM** |
| **9** | Establishing and Analyzing Entropy Energy Balance |
| **10** | Vapor power cycles |
| **11** | Vapor power cycles |
| **12** | Gas Power Cycles |
| **13** | Gas Power Cycles |
| **14** | Refrigeration cycles |
| **15** | Refrigeration cycles |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 3 | 30 |
| Homework | 5 | 5 | 25 |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 6 | 12 |
| 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 | 1 | 17 | 17 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 18 | 18 |
|  | **Total workload** | | **150** |
|  | **Total workload / 30** | | **5** |
|  | **Course ECTS Credits** | | **5** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | 5 |
| Homework | 10 |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 5 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Sait Yorgun | Prof. Dr. Hakan Demiral |  |  |
| **Signature** |  |  |  |  |

22/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Heat Transfer | 151615402 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 3 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| --- | --- | --- |
| **Prerequieite(s)** | |  | | --- | | - | |
| **Course Objectives** | To teach the theoretical foundations of heat transfer science, to introduce students to their applications in Chemical Engineering with numerous sample problem solutions; To prepare part of the necessary infrastructure for Separation Processes, Chemical Engineering Laboratory I, II, III, Reactor Design, Design in Chemical Engineering I, II courses. |
| **Course Description** | Molecular mechanism of heat transport, one dimensional heat transport via molecular mechanism and convection, multidimensional and unsteady state heat transfer, heat transfer in turbulent flow, heat transfer by radiation, interphase heat transfer, macroscopic energy balances and applications. |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Classifies heat transfer mechanisms. | 1c | 1, 8, 10 | A, D |
| **2** | Calculates thermal conductivity. | 1c | 1, 8, 10 | A, D |
| **3** | Solves heat transfer problems on small and large scales | 1c | 1, 8, 10 | A, D |
| **4** | Derive temperature distribution equations for laminar flow | 1c | 1, 8, 10 | A, D |
| **5** | Solves radiative heat transfer problems | 1c | 1,8, 10 | A, D |
| **6** | Prepares and presents the project. | 1c, 1d, 2, 6b, 7a, 8 | 10, 12, 14, 15 | E, G |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Bird, R. B., Stewart, W. E., Lightfoot, E. N., “Transport Phenomena”, 2nd edition, John Wiley, New York, 2002. |
| **Other References** | **1.** Incropera, F. P., DeWitt, D. P., (Çeviri: T. Derbentli vd.), “Isı ve Kütle Geçişinin Temelleri”, Dördüncü basımdan çeviri, Literatür, İstanbul, 2001.  **2.** McCabe, W. L., Smith, J. C., Harriot, J. C., “Unit Operations of Chemical Engineering”, 5th edition., McGraw Hill, New York, 1993. |
| **Tools and Equipment Required** | Computer and projector. |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Introduction and the Course Objectives, Thermal Conductivity |
| **2** | Mechanisms of Energy Transport |
| **3** | One Dimensional Heat Transport via Molecular Mechanism |
| **4** | Shell Energy Balance Applications |
| **5** | Shell Energy Balance Applications |
| **6** | The Equations of Change for Nonisothermal Systems |
| **7** | Homework Presentation |
| **8** | **MIDTERM** |
| **9** | The Equations of Change for Nonisothermal Systems |
| **10** | Temperature Distributions with More than One Independent Variable, Temp. Dist. in Turbulent Flow |
| **11** | Interphase Heat Transport |
| **12** | Energy Transport by Radiation |
| **13** | Macroscopic Energy Balances and Applications |
| **14** | Homework Presentations |
| **15** | Project Presentations |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 2 | 12 | 24 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) | 1 | 15 | 15 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **135** |
|  | **Total workload / 30** | | **4.5** |
|  | **Course ECTS Credits** | | **5** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 10 |
| Project | 10 |
|  |  |
|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 1 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. İlker KIPÇAK | Doç. Dr. Ceyda BİLGİÇ |  |  |
| **Signature** |  |  |  |  |

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Mass Transfer | 151615403 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 5 | 3 | 0 | 3 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To teach the theoretical foundations of mass transfer science, to introduce students to their applications in Chemical Engineering with numerous sample problem solutions; To prepare part of the necessary infrastructure for Separation Processes I, II, Chemical Engineering Laboratory I, II, III, Reactor Design, Design I and II courses in Chemical Engineering. |
| **Course Description** | Molecular mechanisms of mass transport, one dimensional mass transport via molecular mechanism and convection, multidimensional and unsteady state mass transfer, mass transfer in turbulent flow, interphase mass transfer, macroscopic balances for multicomponent systems and some applications. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Classify the mechanisms of mass transport | 1c | 1, 8, 10 | A, D |
| **2** | Defines and calculates mass diffusivity. | 1c | 1, 8, 10 | A, D |
| **3** | Solve mass transfer problems on small and large scales | 1c | 1, 8, 10 | A, D |
| **4** | Finds expressions for concentration distribution in laminar flow. | 1c | 1, 8, 10 | A, D |
| **5** | Solve and present the problem given as project | 1c, 1d, 2, 6b, 7a, 8 | 10, 12, 14, 15 | E, G |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Bird, R. B., Stewart, W. E., Lightfoot, E. N., “Transport Phenomena”, 2nd edition, John Wiley, New York, 2002. |
| **Other References** | **1.** Incropera, F. P., DeWitt, D. P., (Çeviri: T. Derbentli vd.), “Isı ve Kütle Geçişinin Temelleri”, Dördüncü basımdan çeviri, Literatür, İstanbul, 2001.  **2.** McCabe, W. L., Smith, J. C., Harriot, J. C., “Unit Operations of Chemical Engineering”, 5th edition., McGraw Hill, New York, 1993. |
| **Tools and Equipment Required** | Computer and projector. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction and the Course Objectives, Diffusivity |
| **2** | Diffusivity and Mechanisms of Mass Transport |
| **3** | Molecular and Transport Transport of Mass in One Dimension |
| **4** | Shell Mass Balance Applications |
| **5** | Shell Mass Balance Applications |
| **6** | The Equations of Change for Multicomponent Systems |
| **7** | Homework presentations |
| **8** | **MIDTERM** |
| **9** | The Equations of Change for Multicomponent Systems |
| **10** | Concentration Distributions with More Than One Independent Variable |
| **11** | Mass Transfer in Turbulent Flow |
| **12** | Interphase Mass Transport |
| **13** | Macroscopic Balances and Applications for Multicomponent Systems |
| **14** | Homework Submission |
| **15** | Project Presentation |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 2 | 12 | 24 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) | 1 | 15 | 15 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **135** |
|  | **Total workload / 30** | | **4.5** |
|  | **Course ECTS Credits** | | **5** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 10 |
| Project | 10 |
|  |  |
|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 1 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Demet TOPALOĞLU YAZICI | Prof. Dr. İlker KIPÇAK |  |  |
| **Signature** |  |  |  |  |

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Instrumental Analysis | 151615404 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 5 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 | 1 |  |  |  |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To gain the theoretical knowledge necessary to obtain information about matter that cannot be obtained by classical methods through instrumental methods. |
| **Course Description** | Classification of Instrumental Analysis Methods, Chromatographic Methods, High Pressure Liquid Chromatography, Gas Chromatography, Mass Spectroscopy (LC-MSMS), Mass Spectroscopy (ICP-MS), Beam and Matter Interactions, Ultraviolet Visible Field Spectroscopy, Infrared Spectroscopy, Raman Spectroscopy, Nuclear Magnetic Resonance Spectroscopy. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines instrumental analysis methods. | 1b | 1 | A, D |
| **2** | Recognizes the theoretical knowledge required to obtain data using instrumental methods. | 1b | 1 | A, D |
| **3** | Explains chromatographic methods (high pressure liquid chromatography, gas chromatography) and discusses their differences/similarities. | 1b,4a | 1 | A, D |
| **4** | Explains Mass Spectroscopy (LC-MSMS and ICP-MS) and  Interprets matter and ray interactions. | 1b | 1 | A, D |
| **5** | Explains spectroscopic methods (ultraviolet spectroscopy, infrared spectroscopy, raman spectrometry, nuclear magnetic resonance spectroscopy, mass spectroscopy, atomic absorption spectroscopy) and discusses their differences/similarities. | 1b, 4a | 1 | A, D |
| **6** | Presents homework assignments on certain subjects by working in groups. | 6b, 7a, 7c, 7d | 15,18 | D, E |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |

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| --- | --- |
| **Textbook** | Gündüz, T., “İnstrumental Analiz”, Gazi Kitabevi, 2012. |
| **Other References** | **1.** Erdik, E., “Organik Kimyada Spektroskopik Yöntemler”, Gazi Kitabevi, 1998.  **2.** Douglas, A., Skoog, F., Holler, J., Nieman, T. A., “Principles of Instrumental Analysis”, Saunders College Publishing, 1998. |
| **Tools and Equipment Required** | Computer and projector. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, Classification of Instrumental Analysis Methods |
| **2** | Chromatographic Methods; High Pressure Liquid Chromatography |
| **3** | Gas Chromatography |
| **4** | Mass Spectroscopy (LC-MSMS) |
| **5** | Mass Spectroscopy (ICP-MS) |
| **6** | Beam and Matter Interactions |
| **7** | Ultraviolet Visible Field Spectroscopy |
| **8** | **MIDTERM** |
| **9** | Infrared Spectroscopy |
| **10** | Raman Spectroscopy |
| **11** | Nuclear Magnetic Resonance Spectroscopy |
| **12** | Nuclear Magnetic Resonance Spectroscopy |
| **13** | Homework presentations |
| **14** | Homework presentations |
| **15** | Homework presentations |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 12 | 2 | 28 |
| Homework | 1 | 8 | 8 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 12 | 12 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 14 | 14 |
|  | **Total workload** | | **92** |
|  | **Total workload / 30** | | **92/30** |
|  | **Course ECTS Credits** | | **3.06** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 20 |
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| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 2 |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Duygu KAVAK | Doç. Dr. Ceyda BİLGİÇ |  |  |
| **Signature** |  |  |  |  |

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Instrumental Analysis Laboratory | 151615405 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 5 | 0 | 2 | 1 | 2 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 1 |  |  |  |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Performing analyzes with spectroscopic and chromatographic devices and interpreting experimental results. |
| **Course Description** | Gas chromatography, high performance liquid chromatography, mass spectrometry, ultraviolet and visible field spectroscopy, infrared spectroscopy, nuclear magnetic resonance spectrometry |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Conducts experiments and writes reports using the High Performance Liquid Chromatography device. | 1b, 4a, 5b, 6b,7a, 7c | 1,3,5,15 | B, E |
| **2** | Conducts experiments on Gas Chromatography device and writes reports | 1b, 4a, 5b, 6b,7a, 7c | 1,3,5,15 | B, E |
| **3** | Performs experiments on mass spectrometry (LC-MSMS and ICP-MS) devices and writes reports. | 1b, 4a, 5b, 6b,7a, 7c | 1,3,5,15 | B, E |
| **4** | Conducts qualitative analysis and writes reports using the Ultraviolet-Visible Spectroscopy device. | 1b, 4a, 5b, 6b,7a, 7c | 1,3,5,15 | B, E |
| **5** | Performs analysis with Infrared Spectroscopy device and writes reports. | 1b, 4a, 5b, 6b,7a, 7c | 1,3,5,15 | B, E |
| **6** | Conducts analysis with nuclear magnetic resonance spectrometer device and writes reports. | 1b, 4a, 5b, 6b,7a, 7c | 1,3,5,15 | B, E |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | ESOGÜ Kimya Mühendisliği Bölümü Aletli Analiz Laboratuvarı Deney Kılavuzu, 2010. |
| **Other References** | Gündüz, T., “İnstrumental Analiz”, Gazi Kitabevi, 2012. |
| **Tools and Equipment Required** | Analyzers used for the relevant experiment, various chemicals and glassware, laboratory coats, gloves, glasses, etc. protective equipment |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | High Performance Liquid Chromatography |
| **2** | Gas Chromatography |
| **3** | Gas Chromatography |
| **4** | Mass Spectroscopy (LC-MSMS) |
| **5** | Mass Spectroscopy (LC-MSMS) |
| **6** | Mass Spectroscopy (ICP-MS) |
| **7** | Mass Spectroscopy (ICP-MS) |
| **8** | **MIDTERM** |
| **9** | Ultraviolet-Visible Spectroscopy |
| **10** | Ultraviolet-Visible Spectroscopy |
| **11** | Infrared Spectroscopy and Raman Spectroscopy |
| **12** | Infrared Spectroscopy and Raman Spectroscopy |
| **13** | Nuclear Magnetic Resonance Spectroscopy |
| **14** | Nuclear Magnetic Resonance Spectroscopy |
| **15** | Make-up Experiments |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) |  |  |  |
| Homework |  |  |  |
| Quiz | 7 | 0.5 | 3.5 |
| Quiz preparation | 7 | 0.5 | 3.5 |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 7 | 5 | 35 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | | **70** |
|  | **Total workload / 30** | | **2.3** |
|  | **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Quiz | 50 |
| Report | 50 |
|  |  |
|  |  |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 5 |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 5 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 5 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Duygu  KAVAK | Doç. Dr. Ceyda  BİLGİÇ |  |  |
| **Signature** |  |  |  |  |

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Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
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| **Course Name** | **Course Code** |
| German I | 151615408 |

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

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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** |
| German | Undergraduate | Elective |

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| **Prerequieite(s)** |  |
| **Course Objectives** | This lesson provides that tense conceps and to construe, understanding and answering of the speaking in elemantary level to the students. |
| **Course Description** | Elemantary of German Grammer |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Ability to use basic german language rules | 7b | 1, 5 | A |
| **2** | Ability to use language in class. | 7b | 1, 5 | A |
| **3** | Ability to understand German dialogues. | 7b | 1, 5 | A |
| **4** | Ability to read and understand a German text | 7b | 1, 5 | A |
| **5** | Ability to communicate with people who speak German | 7b | 1 | A |
| **6** | Ability to express themselves by written communication | 7b | 1, 5 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Schulz-Griesbach: Deutsche Sprachlehre für Auslaender |
| **Other References** | 1. G. Mahler und R Schmitt: Wir lernen Deutsch  2. Dreyer-Schmitt: Lehr- und Übungsbuch der deutschen Grammatik  3. E. Frangou und E. Kokkini: Grammatikland, Band 1 und 2 |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Das Alphabet,die Verben sein und haben, Personalpronomen |
| **2** | Der Artikel, das Verb, Praesens |
| **3** | Das Substantiv, Singular und Plural |
| **4** | Der Akkusativ |
| **5** | Der Satz, die Zahlen |
| **6** | Praesens der starken Verben. |
| **7** | Trennbare und untrennbare Verben |
| **8** | **MIDTERM** |
| **9** | Trennbare und untrennbare Verben |
| **10** | Fragepronomen, der Imperativ |
| **11** | Wortstellung, Negation |
| **12** | Der Dativ |
| **13** | Possessivpronomen |
| **14** | Wiederholung und Übungen |
| **15** | Wiederholung und Übungen |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 5 | 5 |
| Semester final exam | 1 | 1.5 | 1.5 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **55** |
|  | **Total workload / 30** | | **1.83** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

3/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| English Written Communication | 151615409 |

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| **Semester** | **Weekly Course Period** | | **Theory** | **Practice** |
| **Theory** | **Practice** |
| 5 | 2 | 0 | 2 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | - | 2 |

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| **Course Language** | **Course Level** | **Course Type** |
| English | Undergraduate | Elective |

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| --- | --- |
| **Prerequieite(s)** | English I, English II |
| **Course Objectives** | Expressing oneself in foreign language through main written communication methods (mail, letter, memorandum, solution offers, defining problems, and making offers). |
| **Course Description** | Written communication methods, articles, business letters, e-mails, request letters, reports |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Reads and understands English texts on current issues | 7b, | 1, 5, 11 | A |
| **2** | Writes personal or professional profile in English. | 6a, 7b | 1, 11, 12 | A |
| **3** | Writes a letter of recommendation in English. | 6a, 7b, 8 | 1, 6, 11 | A |
| **4** | Expresses his opinion in English by writing about the product, movie, restaurant, etc. | 4b, 6a, 7b | 8, 11, 15 | A |
| **5** | Writes formal and informal letters in English. | 6a, 7b | 11 | A |
| **6** | Writes job pre-application letter in English. | 6a, 7b, 8 | 6 | A |
| **7** | Writes CV in English. | 6a, 7b | 1, 6, 11 | A |
| **8** | Understands and writes business letters in English. | 6a, 7b | 1, 6, 11 | A |
| **9** | Writes an opinion paragraph in English. | 6a, 7b | 1, 6, 11 | A |
| **10** | Writes different types of paragraphs | 6a, 7b | 1, 6, 11 | A |

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| **Textbook** | Smoothing Your Way for Academic Writing |
| **Other References** | Materials Pack (as compiled from online resources) |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Introduction |
| **2** | Writing A Profile (Personal & Professional Profiles) |
| **3** | Writing Formal/Informal E-Mails & Letters |
| **4** | Writing Reviews (Services, products, events etc.), |
| **5** | Writing E-mails/Letters About A Problem |
| **6** | Writing An E-mail Cover Letter |
| **7** | Writing A CV |
| **8** | **MIDTERM** |
| **9** | The process of writing academically / Sentence types / Learning how to use connectors |
| **10** | Outlining A Paragraph |
| **11** | Paragraph Structure 1 (Topic Sentence..) |
| **12** | Paragraph Structure 2 (Supporting, concluding) |
| **13** | Types of Paragraphs 1 (Process Analysis) |
| **14** | Types of Paragraphs 2 (Opinion) |
| **15** | Types of Paragraphs 3 (Compare & Contrast) |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 2 | 1 | 2 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 3 | 3 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  | - |
|  | - |
|  | - |
|  | - |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | Knowledge about project management, risk management and change management |  |
| Awareness of the significance of entrepreneurship and innovation |  |
| Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

8/8/2022

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Açıklama otomatik olarak oluşturuldumetin, simge, sembol, logo, amblem içeren bir resim

Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Society and Gender | 151616374 |

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

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  |  |  | 2 |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To show the universal and cultural effects of gender on human evolution, human psychology and social structure, and to increase students' awareness and social sensitivity levels. |
| **Course Description** | Understanding the difference between science, art, philosophy and general emotions in human life that parallel human evolution. |

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| **Course Outcomes** | | **Contributed program outcomes** | | **Education Methods\*** | **Asessment Methods \*\*** |
| 1. **1** | Understanding the difference between social and biological gender. | 11 | 1 | | A |
| 1. **2** | Developing awareness about gender psychology. | 11 | 1 | | A |
| 1. **3** | Examining gender from a multidisciplinary perspective, | 9a | 1, 11 | | A |
| 1. **4** | Comparison of gender perception in different political systems. | 11 | 1 | | A |
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| **Textbook** | 1. Doğramacı, Emel. (1992), Türkiyede Kadının Dünü ve Bugünü, Ankara, Türkiye İş Bankası Yay. 2. Beck Jan Mansvelt. Çevre ve Üçüncü Dünya, Endülüs Yayınları, İstanbul 1990. |
| **Other References** | 1. Eröz, M. ve Güler, A. (1999), Türk Ailesi, Ankara, Atatürk Kültür Merkezi Başkanlığı Yay. 2. Flowers, Erin Wehr. (2006),Differences between Male and Female Students 3. Confidence,Anxiety and Attitude toward Learning Jaz İprovisation”, Journal of Research in Music Education, V.54, No.4. 4. Frederiksen, Bodil Folke. (2000), “Popular Culture, Gender Relations and 5. Democratization of Everyday Life in Kenya”, Journal of Southern African Studies, Vol.26, No.2. 6. Moghadam, Valentine M. (1999), “Gender and Globalization: Female Labor and Women’s Mobilization” Journal of World Systems Research, V.2. |
| **Tools and Equipment Required** | Books and articles |

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| **COURSE SYLLABUS** | |
| **1** | Gender psychology, general introduction and principles |
| **2** | Woman in business |
| **3** | Women in different cultures |
| **4** | Women in education |
| **5** | Woman in family |
| **6** | Women in law, research, art and architecture |
| **7** | Women in communication |
| **8** | **MIDTERM** |
| **9** | Movie screening |
| **10** | Oppression on women |
| **11** | Approach of different religions to women |
| **12** | Women in science |
| **13** | Woman in old age |
| **14** | Evaluation and discussion |
| **15** | Evaluation and discussion |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 5 | 5 |
| Semester final exam | 1 | 1,5 | 1,5 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **55** |
|  | **Total workload / 30** | | **1.8** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

15/07/2022

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Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Introduction To Culturel Anthropology | 151615414 |

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

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| --- | --- | --- | --- | --- |
| **Dersin Kategorisi (kredi dağılımı)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | - | 2 |

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

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| --- | --- | --- | --- | --- | --- |
| **Prerequieite(s)** | | - | | | |
| **Course Objectives** | | Introduction to social anthropology and the basic theories of anthropology, the position of anthropology and its relationship with other branches of science, and emphasizing its universal importance. | | | |
| **Course Description** | | This course is an introduction to fundamental topics in the discipline of anthropology. The development of anthropology as a social science, its relationship with other branches of social sciences and its position in developing and developed countries constitute the topics of this course. | | | |
| **Course Outcomes** | | | **Contributed program outcomes** | **Education Methods \*** | **Assessment Methods \*\*** |
| **1** | Learns biological and cultural developments in human history | | 11 | 1 | A |
| **2** | Compares this information with modern cultural life. | | 11 | 1 | A |
| **3** | Analyzes the acquired information with contemporary culture. | | 9a | 11 | A |
| **4** | Synthesizing old and new in product design. | | 11 | 1 | A |
| **5** | Compares the stages in human history in terms of social and cultural aspects. | | 11 | 1 | A |
| **6** | | |  |  |  |
| **7** | | |  |  |  |
| **8** | | |  |  |  |
| **9** | | |  |  |  |
| **10** | | |  |  |  |

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| **Textbook** | 21.y.yılda Kültürel Antropolji, “İnsanın Doğadaki Yeri” Daniel G. Bates İstanbul Bilgi Üniversitesi, 2009. Bilgeseven, Amiran Kurtkan, Eğtim Sosyolojisi, İstanbul, 1992. |
| **Other References** | 1. Küçük Yerler Büyük Meseleler: Sosyal ve Kültürel Antropoloji, Birleşik Yayınevi, 2009 2. Antropoloji, Marc Auge, Dost Kitabevi, 2005 -Sosyoloji ve Antropoloji, Marcel Mauss Doğu-Bati Yayınevi, 2005 -Tüfek Mikrop ve Celik, Jared M. Diamond, Film 3. Insan Davranısının Kültürel Temelleri, Philip K.Bock, Imge yayınevi, 2001 4. Antropoloji: Kuramlar Kuramcılar, Sibel Ozbudun, Dipnot Yayınevi, 10-2005 5. Antropoloji: Insan Cesitliliğine bir bakış, Conrad Phillip Kottak, Utopya Yayınevi, 2001 |
| **Tools and Equipment Required** | Kitaplar ve makaleler |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | General entry and change process |
| **2** | Nature of anthropology (its relationship with other social sciences) |
| **3** | Basic anthropological theories |
| **4** | 3 major evolutionary theories and 2 major evolutions in human history |
| **5** | Anthropological screenings (films) and discussion |
| **6** | Cultural terms (culture, society and individual)- Characteristics of culture and cultural processes |
| **7** | Universal problems, local responses and the role of anthropology |
| **8** | **MIDTERM** |
| **9** | Language and communication |
| **10** | Social identity, self and gender |
| **11** | Economic systems |
| **12** | Family and household |
| **13** | Kinship and ancestry |
| **14** | Examining art from an anthropological perspective |
| **15** | Examining art from an anthropological perspective |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 5 | 5 |
| Semester final exam | 1 | 1.5 | 1.5 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **55** |
| **Total workload / 30** | | **1.8** |
| **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 5 |

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

15/7/2022

amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Labor Legistation | 151615418 |

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

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | 2 | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To inform students about the rights and responsibilities they will have as employees, employer representatives or employers when they start working life. |
| **Course Description** | History and Sources of Labor Law, Labor Law and its Field of Application, Making an Employment Contract and Its Types, Wage and Work Debt, Termination of an Employment Contract and its Legal Consequences, Working Order, History of Trade Unions, Establishment of Trade Unions, Organs of Trade Unions, Union Membership and Activities, Collective Labor Agreement, Collective Labor Dispute Resolution, Strike and Lockout. |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Realizes the importance of labor law. | 11 | 1 | A |
| **2** | Defines concepts in the field of labor law. | 11 | 1 | A |
| **3** | Realizes the rights of employees. | 11 | 1 | A |
| **4** | Solves problems that may be encountered in working life. | 11 | 1 | A |
| **5** | Recognizes the function of unions. | 11 | 1 | A |
| **6** | Summarizes the application areas of labor law. | 11 | 1 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Güven E., ve.Aydın, U. “Bireysel İş Hukuku”, Nisan Kitabevi, Eskişehir, 2010. |
| **Other References** | 1. Çelik, N., “İş Hukuku Dersleri”, Beta Yayıncılık, İstanbul, 2003.  2. Sümer, H. H., “İş Hukuku”, Mimoza Yayıncılık, Konya, 2003.  3. Şakar, M., “İş Hukuku”, Beta Yayıncılık, İstanbul, 2003.  4. Erkul, İ. ve Gökçek Karaca, N, “4857 Sayılı İş Kanunu ve Uygulaması”, Pelikan Yayıncılık, Nisan Kitabevi, Eskişehir, 2004. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | History and Sources of Labor Law |
| **2** | Labor Law and Application Area |
| **3** | Making an Employment Contract and Its Types |
| **4** | Wage and Employment Debt |
| **5** | Termination of Employment Contract |
| **6** | Legal Consequences of Termination of Employment Contract |
| **7** | Working Order |
| **8** | **MIDTERM** |
| **9** | History of Unions |
| **10** | Establishment and Structure of Trade Unions |
| **11** | Union Membership and Activities |
| **12** | Collective Labor Agreement |
| **13** | Resolution of Collective Labor Disputes |
| **14** | Strike and Lockout |
| **15** | Strike and Lockout |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| 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** | | **86** |
|  | **Total workload / 30** | | **2.87** |
|  | **Course ECTS Credits** | | **3** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 5 |

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

27/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Chemical Reaction Engineering I | 151616373 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | Students will be able to describe chemical reactions encountered both in everyday life and in chemical engineering. They will also be able to educate themselves to solve problems and improve their understanding of basic chemical reaction engineering. |
| **Course Description** | Thermodynamics of Chemical Reactions; the kinetics of a homogeneous reactions; interpretation of batch reactor data; complex reactive systems; ideal batch reactors. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Describes the homogeneous reactions | 1d | 1, 2, 5, 6, 10 | A, B, D |
| **2** | Derives design equations using mass balances for batch and continuous reactors and use them in reactor design. | 1d, 2 | 1, 2, 5, 6, 10 | A, B, D |
| **3** | Designs multiple reactor systems. | 1d, 2 | 1, 2, 5, 6, 10 | A, B, D |
| **4** | Determines the reaction rate expression by analyzing experimental data in fixed and variable volume systems. | 1d, 2 | 1, 2, 5, 6, 10 | A, B, D |
| **5** | Analyzes the effect of temperature and pressure on the reaction rate. | 1d, 2 | 1, 2, 5, 6, 10 | A, B, D |
| **6** | Solves complex engineering problems using different methods. | 1d, 2 | 1, 2, 5, 6, 10 | D |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Basan, S., “Temel Kimyasal Tepkime Mühendisliği”, Gazi Kitabevi, , 2010. |
| **Other References** | 1. Levenspiel, O. “Chemical Reaction Engineering”, John Wiley, New York, 1999 2. Smith, J. M. , “Chemical Engineering Kinetics” , McGraw Hill, London, 1981. 3. Cooper, A. R. and Jeffreys, G. V., “Chemical Kinetics and Reactor Design”, Birmingham, U.K, 1971. 4. Fogler, H. S., “Elements of Chemical Reaction Engineering”, Prentice-Hall International Inc., 1999 (3. Basım). 5. Altiokka, M.R., Ödeş, E., “Kimyasal Tepkime Mühendisliği”, Palme Yayıncılık, 2016 |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Introduction; Explaining the grading policy applied for the course, the purpose and content of the course |
| **2** | Kinetics of Homogeneous Reactions - Terminology of Chemical Reaction Engineering Kinetics |
| **3** | Batch Reactor Mole Balances |
| **4** | Continuous Reactor Mole Balances |
| **5** | Conversion, Reactor Size and Multi-Reactor Systems |
| **6** | Applications of Design Equations |
| **7** | Applications of Design Equations |
| **8** | **MIDTERM** |
| **9** | Rate of Reactivity and Rate Law |
| **10** | Rate of Reactivity and Rate Law |
| **11** | Stoichiometry in Batch and Continuous Systems |
| **12** | Variable Volume Reaction Systems |
| **13** | Analysis Applications of speed data |
| **14** | Analysis Applications of speed data |
| **15** | Analysis Applications of speed data |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | 2 | 5 | 10 |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 3 | 6 |
| 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 | 15 | 15 |
| Semester final exam | 1 | 1.5 | 1.5 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **126** |
|  | **Total workload / 30** | | **4.2** |
|  | **Course ECTS Credits** | | **4** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Quiz | 15 |
| Homework | 15 |
|  |  |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 5 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 5 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof.Dr. Hilal Demir Kıvrak | Öğr. Gör. Murat DOĞRU |  |  |
| **Signature** |  |  |  |  |

22/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Seperation Operations | 151616374 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 2 | 4 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 | 1 |  |  |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | Determination of ideal and real stage number of distillation columns; determination of heating-cooling requirements; placing of trays and finding column diameter; doing necessary calculation for distillation of multiple components by FUG method; Design of packed absorption columns. Basic concepts of drying; interpretation of drying curves and drying rate curves; estimation of drying time. Understanding the significance of membrane separation and introducing membrane separation processes. |
| **Course Description** | Introduction and Basic Concepts; Distillation; Absorption; Drying; Membrane Separation |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the separation processes, the principles of separation they are based on, and their differences. | 1d, 6a, 7a | 1,2,7,11 | A, B, D |
| **2** | Be able to select the appropriate separation method(s) for the mixture subjected to separate. | 1d, 4a, 6a,7a | 1,11 | A, B, D |
| **3** | Designs distillation columns for binary mixtures. | 1d, 2, 3, 4b, 6b, 7a | 1,12 | A, B, D |
| **4** | Performs necessary calculations for the distillation of multi-component mixtures. | 1d,2 | 1 | A, B, D |
| **5** | Reminds the knowledge about mass transfer equations and coefficients; and associate these with gas absorption. | 1d, 6a, 7a | 1,11 | A, B, D |
| **6** | Designs packed-absorption columns. | 1d, 2, 3 | 1 | A, B, D |
| **7** | Describes drying processes, recognizes some type of dryers and estimates drying time for solid materials. | 1d, 6a, 7a | 1,11 | A, B, D |
| **8** | Explains membranes, membrane separation, driving forces in membrane processes, advantages and disadvantages of membrane processes; use basic transport equations for some membrane processes. | 1d, 6a, 7a | 1,11 | A, B, D |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | McCabe, W.L., Smith, J.C., Harriot, J.C., “Unit Operations of Chemical Engineering”, 5th ed., McGraw Hill, New York, 1993. |
| **Other References** | 1. Giriş ve Temel Kavramlar, Kurutma ve Membranla Ayırma konularına ait ders notları.  2. Yapıcı, S., (çeviren), Taşınma Süreçleri ve Ayırma Süreci İlkeleri (temel işlemleri içerir), İzmir Güven Kitapevi, 2011. (orijinal kaynak:Geankoplis, C.J.,Transport Processes and Separation Process Principles (includes unit operations), 4.ed., Prentice Hall of India, 2007.)  3. Uysal, B. Z., “Kütle Transferi: Esasları ve Uygulamaları”, Gazi Üniv. MMF Yayını, Ankara, 1996.  4. Alpay, E., Kütle Aktarımı ve Kütle Aktarımı İşlemleri, Ege Ü. Yay., Müh. Fak Yayın No 50, İzmir 2011 |
| **Tools and Equipment Required** | Computer, projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction and Basic Concepts |
| **2** | Distillation |
| **3** | Distillation |
| **4** | Distillation |
| **5** | Distillation |
| **6** | Distillation |
| **7** | Distillation |
| **8** | **MIDTERM**  Finding the ideal number of shelves, heating- cooling needs, shelf efficiency and column diameter in rack distillation columns for binary mixtures according to the McCabe-Thiele and Ponchon-Savarit methods; Brief introduction of azeotropic, extractive and reactive distillation methods, making the necessary calculations with the FUG method for the distillation of multiple component mixtures. |
| **9** | Absorption  Brief review of mass transfer equations and coefficients as a basis for packed absorption column design; Determination of filling height and column diameter in filled absorption columns. |
| **10** | Absorption |
| **11** | Absorption |
| **12** | Drying: Definition, purpose and importance of drying; Brief introduction of dryers. |
| **13** | Drying: Drying phase balance, drying curve, drying rate curve, drying time calculation in the 1st and 2nd zone |
| **14** | Separation with Membrane: Separation with Membrane, understanding driving forces and membranes; Advantages and disadvantages of membrane processes |
| **15** | Membrane Separation: some membrane processes and basic transport equations |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| Homework | 1 | 25 | 25 |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 5 | 10 |
| 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 | 1 | 25 | 25 |
| Semester final exam | 1 | 2 | 2 |
| Semester final exam preparation | 1 | 25 | 25 |
|  | **Total workload** | | **175** |
|  | **Total workload / 30** | | **5.83** |
|  | **Course ECTS Credits** | | **6** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Mıdterm | 30 |
| Quiz | 20 |
| Homework | 15 |
|  |  |
|  |  |
| **Semester final exam** | 35 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 5 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 2 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. | 2 |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 4 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 4 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Ayşegül Aşkın | Prof. Dr. Fatma Tümsek |  |  |
| **Signature** |  |  |  |  |

1/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Professional English II | 151616375 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | 2 | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To enrich the scientific and technical vocabulary of chemical engineering students and to enable them to learn, analyze and translate sentence structures in scientific articles into Turkish. |
| **Course Description** | English equivalents of terms in the field of Chemistry and Chemical Engineering and translations from English texts related to this field |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Uses English grammar. | 7b | 1, 5 | A |
| **2** | Remembers the English equivalents of terms in the field of chemistry and chemical engineering. | 7b | 1, 5 | A |
| **3** | Analyzes sentence structures in texts in the field of chemistry and chemical engineering and translates them into Turkish. | 7b | 1, 5 | A |
| **4** | Aware of the necessity of foreign languages. | 7b | 1 | A |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Edis, P., “Teknik İngilizce”, İTÜ Vakfı Yayınları, No 2, 4, İstanbul, 1998 |
| **Other References** | 1. “Kimya ve Kimya Mühendisliği ve Çevre Terimleri Kılavuzu”, TMMOB Kimya Mühendisleri Odası, Ankara, 1997. 2. Kimya ve Kimya mühendisliği, İngilizce-Türkçe, Türkçe- İngilizce terimler sözlüğü, Prof. Dr. A. Rıza Berkem, Prof. Dr. Selahattin Gültekin, Türkiye Kimya Derneği yayınlar, İstanbul, 2005. 3. Kimya ve kimya mühendisliği ile ilgili tüm İngilizce metinler ( kitaplar, makaleler, internet kaynakları, vb.). |
| **Tools and Equipment Required** | English Dictionary |

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| **COURSE SYLLABUS** | |
| **1** | General English review |
| **2** | Introduction to chemical engineering terminology in English |
| **3** | Engineering terms in English |
| **4** | English chemical engineering terminology |
| **5** | English chemical engineering terminology |
| **6** | Discussing the English terms and their usage in chemical engineering books. |
| **7** | Discussing the English terms and their usage in chemical engineering books. |
| **8** | **MIDTERM** |
| **9** | Understanding the use of important concepts in chemical engineering in English |
| **10** | Understanding the use of important concepts in chemical engineering in English |
| **11** | Translation studies from English chemical engineering books and other scientific texts into Turkish |
| **12** | Translation studies from English chemical engineering books and other scientific texts into Turkish |
| **13** | Translation studies from English chemical engineering books and other scientific texts into Turkish |
| **14** | Detailed examination of chemical engineering texts in English |
| **15** | Detailed examination of English chemical engineering texts and necessary reviews |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| 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 | 1 | 8 | 5 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 8 | 5 |
|  | **Total workload** | | 76 |
|  | **Total workload / 30** | | 2.53 |
|  | **Course ECTS Credits** | | 3 |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
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|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Uğur MORALI | Dr. Seda HOŞGÜN |  |  |
| **Signature** |  |  |  |  |

11/11/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Engineering Materials | 151616372 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Credit** | **ECTS** |
| 6 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | Presenting of basic information of Engineering Materials, understanding basically materials and their properties and being basis of other courses are the objectives of this course for engineering students. |
| **Course Description** | Materials Science, Classification of Materials, Atomic Structure, Chemical Bonds, Mechanical Properties, Other Properties of Materials, Development of Properties of Materials, Ferrous Materials, Non-Ferrous Materials, Ceramics, Polymers, Composites, Semiconductors, Nanotechnology, Smart Materials. |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Classifies engineering materials. | 1c | 1,2,5 | A, B |
| **2** | Defines the atomic and bond structures of materials. | 1c | 1,2,5 | A, B |
| **3** | Defines and calculates the mechanical properties of materials. | 1c | 1,2,5 | A, B |
| **4** | Defines the electrical, thermal, optical and magnetic properties of materials. | 1c | 1,2,5 | A, B |
| **5** | Defines the properties of ferrous and non-ferrous materials. | 1c | 1,2,5 | A, B |
| **6** | Selects materials according to usage areas. | 1c | 1,2,5 | A, B |
| **7** | Recognizes nanotechnology and determines current working areas. | 1c | 1,2,5 | A, B |
| **8** | Has knowledge about smart materials and their usage areas | 1c | 1,2,5 | A, B |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | 1. Materials Science and Engineering: An Introduction, by William D. Callister and David G. Rethwisch |
| **Other References** | 1. Malzeme Bilimi, Prof. Dr. Kaşif Onaran 2. Smith, W., ‘Malzeme Bilimi ve Mühendisliği’, (Çeviren: Kınıkoğlu N., YTÜ, İstanbul, 2001.) |
| **Tools and Equipment Required** | Calculator |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Materials Science and History |
| **2** | Atomic Structure and Bonds |
| **3** | Mechanical Properties of Materials |
| **4** | Other Properties of Materials |
| **5** | Improvement of Material Properties |
| **6** | Metallic Materials (General) |
| **7** | Ferrous Materials |
| **8** | **MIDTERM** |
| **9** | Non-Ferrous Materials |
| **10** | Ceramics |
| **11** | Polymers |
| **12** | Composites |
| **13** | Nanotechnology |
| **14** | Semiconductor Materials |
| **15** | Smart Materials |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| Homework |  |  |  |
| Quiz | 1 | 1 | 1 |
| Quiz preparation | 1 | 6 | 6 |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 15 | 15 |
|  | **Total workload** | | **76** |
|  | **Total workload / 30** | | **2.53** |
|  | **Course ECTS Credits** | | **3** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | 15 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

27/9/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Mathematical Modeling In Chemical Engineering | 151615355 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 | 2 | - | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Differential equation course must taken and must be achieved |
| **Course Objectives** | Establishing mass and energy balances in different steady and unsteady processes in chemical engineering and solving the resulting equations using analytical and numerical methods. |
| **Course Description** | Equations, numerical solution of algebraic equations, numerical solution of differential equations, analytical solution of differential equations, basic modelling problems, basic modelling of system with chemical reaction |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Understands the importance of mathematical modeling | 1d | 1,6 | A, B |
| **2** | Explains the principles of modeling | 1d | 1,6 | A, B |
| **3** | Solves algebraic and differential equations numerically and analytically. | 1a | 1,6 | A, B |
| **4** | Solves the model equation of a system using computer programs. | 1a, 1c, 1d, 4a, 6b | 15 | D |
| **5** | Solves the problem by evaluating the data in systems where there are no chemical reactions, making the necessary assumptions and establishing mass and energy balances. | 1c, 1d, 2 | 16 | A, B |
| **6** | Solves by establishing mass and energy balances in systems involving chemical reactions | 1c, 1d, 2 | 1,6 | A, B |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Franks, R.G.E., Modelling and Simulation in Chemical Engineering, John Wiley& Sons, Inc., 1972. |
| **Other References** | 1. Ingham J., Dunn, I.J., Heinzle, E., Snape, J.B., Chemical Engineering Dynamics, Wiley-VCH, 2007 2.Ayyub, B.M., McGuen, RH.,Numerical Methods for Engineers, Prentice-HaII Inc., 1996. 3.Akai, T.J., Applied Numerical Methods for Engineers, John Wiley ( Sons, Inc., 1994 |
| **Tools and Equipment Required** | - |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Algebraic equations and their properties |
| **2** | Numerical solutions of algebraic equations: Direct solution, partial substitution method |
| **3** | Numerical solutions of algebraic equations: Wegtein method, Newton-Raphson method |
| **4** | Numerical solutions of differential equations |
| **5** | Analytical solutions of differential equations |
| **6** | Time variable problems (Concentration problems) |
| **7** | Time variable problems (Liquid level problems) |
| **8** | **MIDTERM** |
| **9** | Steady state size variable systems |
| **10** | Steady state size variable systems |
| **11** | Steady state size variable systems |
| **12** | Mathematical modeling of systems involving chemical reactions: Batch reactors |
| **13** | Mathematical modeling of systems involving chemical reactions: Semi-batch reactors |
| **14** | Mathematical modeling of systems involving chemical reactions: Continuous reactors |
| **15** | Mathematical modeling of systems involving chemical reactions: Continuous reactors |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2,5 | 25 |
| Homework | 5 | 6 | 30 |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 6 | 12 |
| 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 | 1 | 16 | 16 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 19 | 19 |
|  | **Total workload** | | **150** |
|  | **Total workload / 30** | | **5** |
|  | **Course ECTS Credits** | | **5** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
|  |  |
| Homework | 15 |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 2 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 3 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 5 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 2 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Sevgi Şensöz | Doç. Dr. Hakan Demiral |  |  |
| **Signature** |  |  |  |  |

4/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Chemical Engineering Laboratory I | 151616356 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Weekly Course Period** | **Weekly Course Period** |
| 6 | 0 | 2 | 1 | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 | - | - | - | - |

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

|  |  |
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| **Prerequieite(s)** | - |
| **Course Objectives** | To teach students how to carry out experiments which application of previous courses, to teach how to generate reports, to provide experience for students to work in team environment, to teach students how to analyze and interpret experimental data using previous courses materials |
| **Course Description** | Size reduction and sieve analysis, calorific value determination by calorimetry, oil extraction from oilseeds, thermal conductivity determination; biodiesel production, determination of biodiesel properties and comparison with diesel fuel, adsorption, water softening and hardness determination. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Specifies the purpose of the experiment, experimental parameters and test method | 4a, 5b | 2,5 | B, C, E |
| **2** | Collects data by conducting experiments and analyzes the data. | 5b, 6b | 2, 3, 12 | E, I |
| **3** | Presents experimental results using appropriate graphs, tables and figures | 4b, 5b, 6b, 7a | 12, 15 | E |
| **4** | Discusses the experimental results. | 5b, 7a | 3, 5, 7, 15 | C, E |
| **5** | Reports experimental work in accordance with the established rules. | 6b, 7a | 12, 15 | E |
| **6** | Takes an active role within the team in the execution and reporting of the experiment. | 5b, 6b | 3, 12, 15 | E, I |
| **7** | Relates engineering facts, events and situations with his experiments. | 5b | 2, 5 | B, C, E |
| **8** | Recognizes the importance of professional and ethical responsibility. | 9a | 1 | E |
| **9** | Knows laboratory safety and can apply its rules. | - | 1 | I |
| **10** | - |  |  |  |

|  |  |
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| **Textbook** | Kimya Mühendisliği Laboratuvarı I-II-III Deney Kılavuzu (Ed: M. E. Yıldırım) ESOGÜ Yayınları, No:167, 2009 |
| **Other References** | Çataltaş, İ. A., “Kimyasal Proses Endüstrileri I-II”, İnkilap Kitabevi Yayın San. ve Tic. A.Ş., İstanbul, 1985. 2. Perry, R.H., “Perrys Chemical Engineering Handbook”, McGraw-Hill, 1984. 3. Bird, R. B., Stewart, W. E., and Lightfoot, E. N., “Transport Phenomena”, Second Ed., John Wiley, New York, 2002 |
| **Tools and Equipment Required** | Gloves, protective glasses, mask, lab coat. |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Determination of the experimental groups |
| **2** | Giving teh procedure necessary conduct laboratory experiments safely and information about waste management |
| **3** | Size reduction and sieving |
| **4** | Heating value determination with calorimeter |
| **5** | Oil extraction from oily seed |
| **6** | Determination of heating conductivity |
| **7** | Production of biodiesel |
| **8** | **MIDTERM** |
| **9** | Determination of biodiesel properties and comparison of fuel diesel |
| **10** | Adsorption |
| **11** | Water softening and determination of water hardness |
| **12** | Make-up Experiments |
| **13** | Make-up Experiments |
| **14** | Assessment |
| **15** | Assessment |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 8 | 3 | 24 |
| Homework | - | - | - |
| Quiz | 8 | 0,5 | 4 |
| Quiz preparation | 8 | 1 | 8 |
| Oral Exam | 8 | 0.25 | 2 |
| Oral Exam prep | 8 | 1 | 8 |
| Report (including preparation and presentation time) | 8 | 2 | 16 |
| Project (including preparation and presentation time) | - | - | - |
| Presentation (including preparation time) | - | - | - |
|  |  |  |  |
|  |  |  |  |
| Midterm | - | - | - |
| Midterm Exam preparation | - | - | - |
| Semester final exam | - | - | - |
| Final exam preparation | - | - | - |
|  | **Total workload** | | **90** |
|  | **Total workload / 30** | | **3** |
|  | **Course ECTS Credits** | | **3** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Quiz | 30 |
| Oral Exam | 30 |
| Report | 40 |
|  |  |
|  |  |
| **Semester final exam** |  |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 4 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

18/8/2022

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Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Electrochemistry | 151616358 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To give the fundamentals of electrochemistry and electrochemical reactions, to teach the application areas of electrochemistry in industry and to provide the opportunity to see some of them on site. |
| **Course Description** | Introduction to electrochemistry; electrochemical terms and concepts; Faraday's laws; electrochemical cells; electrode potentials; fundamentals of mechanism and kinetics of electrode reactions; mass transfer; corrosion; electrochemistry and environment, electrochemistry in industry; technical tour |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains electrochemical terms and concepts | 1b | 1 | A |
| **2** | Defines electrochemical cells. | 1c | 1 | A |
| **3** | Calculates the battery potential using the Nernst equation. | 1b | 1 | A |
| **4** | Uses Faraday's laws to solve problems. | 1b | 1 | A |
| **5** | Defines corrosion phenomenon and corrosion prevention methods. | 1c | 1 | A |
| **6** | Explains the applications of electrochemical methods in industry. | 1c, 8 | 1, 9 | A, E |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Yalçın, H. ve Gürü, T., Elektrokimya ve Uygulamaları, Palme Yayıncılık, 2010. |
| **Other References** | 1. Brett, C. M. A. and A. M. O., Brett , “Electrochemistry Principles, Methods, and Applications”, Oxford University Press, 1993. 2. Bagotsky, V. S., Elektrokimyanın Temelleri, Çeviri Editörleri: N.A. Tapan, M.L. Aksu, Nobel Akademik Yayıncılık, 2015. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, Electrochemical Terms and Concepts |
| **2** | Faraday's Laws, Ionic Conductivity |
| **3** | Electrochemical Cells, Nernst Equation |
| **4** | Galvanic Cells |
| **5** | Galvanic Cells |
| **6** | Electrolysis Cells |
| **7** | Electrochemistry and Environment |
| **8** | **MIDTERM** |
| **9** | Corrosion |
| **10** | Corrosion |
| **11** | Mass Transfer in Electrochemical Processes, Electrochemistry Applications in Industry |
| **12** | Technical tour |
| **13** | Electrochemistry Applications in Industry |
| **14** | Electrochemistry Applications in Industry |
| **15** | Technical tour |
| **16,17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 3 | 42 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **106** |
|  | **Total workload / 30** | | **3.5** |
|  | **Course ECTS Credits** | | **4** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
| Technical tour | 20 |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 3 |
| 1. Sufficient basic engineering and chemical engineering knowledge | 3 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | |
| **Instructor(s)** | Doç. Dr. Belgin KARABACAKOĞLU |  |  |
| **Signature** |  |  |  |

18/9/2022

****amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| **Workplace Risk Analysis** | 151616360 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 1 | - | 2 | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | By defining risk factors in a variety of industries (especially in the chemical industry) and the lab, emphasizing that people working in such environments should be in a very sensitive and conscious approach and informing students about methods of risk analysis. |
| **Course Description** | Situations which create risk in workplace, risk management process, risk assessment methods, waste management, legislations related to occupational health and safety, oral presentation and discussion. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Recognizes risk, risk sources, and situations that require risk assessment. | 10a | 1 | A, D |
| **2** | Recognizes the risk analysis process | 10a | 1 | A, D |
| **3** | Risk analysis, explain the advantages and disadvantages of risk analysis. | 10a | 1 | A, D |
| **4** | Calculates the risk factors and outcomes comments. | 10a | 1 | A, D |
| **5** | Risk analysis and explain the differences / similarities are discussed. | 10a | 1 | A, D |
| **6** | Determination of measures, preparation of risk assessment report describes the monitoring and review stages of the audit. | 10a | 1 | A, D |
| **7** | Presents homework assignments on certain subjects by working in groups. | 6b, 7a, 7c, 7d | 15,18 | D, E |
| **8** |  |  |  |  |
| **9** |  |  |  |  |

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| --- | --- |
| **Textbook** | 1. Özkılıç, Ö., “İş Sağlığı Ve Güvenliği Yönetim Sistemleri Ve Risk  Değerlendirme Metodolojileri”, 2005. |
| **Other References** | 1. Kahya, E. Özkar D., “İş Güvenliği”, Eskişehir Osmangazi Üniversitesi, 2014.  2. Yiğit, A., “İş güvenliği ve işçi sağlığı”, Alfa akademi basım yayım, 2005.  3. Canel, M., “Laboraratuvar Güvenliği”, Ankara Üniversitesi Fen Fakültesi Yayınları, Ankara, 2003. |
| **Tools and Equipment Required** | Computer and projector. |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Introduction, telling the purpose and content of the course, giving the exam percentages applied for the course |
| **2** | Risk, Sources of Risk, situations requiring Risk assessment, Risk Assessment Process |
| **3** | Risk analysis, advantages and disadvantages of risk analysis, calculating the Risk Factor |
| **4** | Preliminary Hazard Analysis, Job Safety Analysis, Preliminary Risk Analysis |
| **5** | What if...? Safety Audit, Event Tree Analysis |
| **6** | Fault Tree Analysis, Cause-Consequence Analysis, |
| **7** | Hazard Classification and Rating, Asessment Decision Matrix |
| **8** | **MIDTERM** |
| **9** | Hazard and Operability Studies (HAZOP) |
| **10** | Hazard and Operability Studies (HAZOP) |
| **11** | Possible Failure Types and Effects Analysis Method, Checklists |
| **12** | Determination of Precautions, Preparation of Risk Assessment Report, Audit Monitoring and Review |
| **13** | Homework presentations |
| **14** | Homework presentations |
| **15** | Homework presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 12 | 2 | 28 |
| Homework | 1 | 15 | 15 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 16 | 16 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 17 | 17 |
|  | **Total workload** | | **120** |
|  | **Total workload / 30** | | **4** |
|  | **Course ECTS Credits** | | **4** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 30 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 35 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management | 5 |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Duygu KAVAK |  |  |  |
| **Signature** |  |  |  |  |

8/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Green and Sustainable Chemistry and Engineering | 151616361 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To emphasize the importance of green chemistry and green engineering and to teach their difference from chemistry and engineering. It is also important to have knowledge about important environmental, health and safety issues. |
| **Course Description** | Why green chemistry and engineering, Green Chemistry and Green Engineering principles, Important environmental, health and safety issues, Measurements in green chemistry, Selection of Solvents and Catalysts, Renewable energy sources, Renewable materials, Project presentations |

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Outcomes** | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1** | Able to answer the question 'why green chemistry.' | 8, 11 | 1 | A |
| **2** | Describes the principles of green chemistry and green engineering. | 11 | 1 | A |
| **3** | Knows the most common environmental, health and safety problems. | 8, 11 | 1 | A |
| **4** | Describes commonly used methods for measuring green. | 11 | 1 | A |
| **5** | Understands the role of solvents and catalysts in the processing processes of green chemistry. | 11 | 1 | A |
| **6** | Defines renewable energy sources and realizes the importance of using renewable resources. | 8, 11 | 1 | A |
| **7** | Prepares a project, examines, designs, comments, evaluates and presents it while preparing the project. | 6b, 7a, 8 | 1 | D |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | Concepcion J. G.- David J. C. Constable, Yeşil Kimya ve Mühendislik Pratik Bir Tasarım Yaklaşımı, 1. Baskıdan Çeviri, Nobel Akademik Yayıncılık Aralık, 2016. |
| **Other References** | M. Koçoğlu Kalkan, Atom Ekonomisi ve Diğer Yeşil Reaksiyon Ölçümleri, Mühendislik ve Fen Bilimleri Dergisi, Sigma 30, 66-74, 2012. |
| **Tools and Equipment Required** | Computer and projector. |

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| **COURSE SYLLABUS** | |
| **1** | Why Green Chemistry? |
| **2** | Green Chemistry Principles |
| **3** | Green Engineering principles |
| **4** | Important Environmental Issues |
| **5** | Important Health Issues |
| **6** | Important Security Issues |
| **7** | Atomic Economics and Other Green Reaction Measurements |
| **8** | **MIDTERM** |
| **9** | Solvers and Solvent Selection Strategies |
| **10** | Catalysts |
| **11** | Catalyst Selection Methods |
| **12** | Recently Developed Materials |
| **13** | Renewable Energy Sources |
| **14** | Homework presentations |
| **15** | Homework presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 12 | 2 | 24 |
| Homework | - | - | - |
| Quiz | - | - | - |
| Quiz preparation | - | - | - |
| Oral Exam | - | - | - |
| Oral Exam prep | - | - | - |
| Report (including preparation and presentation time) | - | - | - |
| Project (including preparation and presentation time) | 1 | 15 | 15 |
| Presentation (including preparation time) | - | - | - |
|  | - | - | - |
|  | - | - | - |
| Midterm | 1 | 1 | 2 |
| Midterm Exam preparation | 1 | 16 | 16 |
| Semester final exam | 1 | 1 | 2 |
| Final exam preparation | 1 | 22 | 22 |
|  | **Total workload** | | **123** |
|  | **Total workload / 30** | | **4.1** |
|  | **Course ECTS Credits** | | **4.0** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Homework | 30 |
|  |  |
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| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 3 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 5 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Yeliz AŞÇI |  |  |  |
| **Signature** |  |  |  |  |

11/11/2022

amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Polymer Chemistry | 151616378 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To give students basic information about polymers and polymer chemistry. |
| **Course Description** | Basic concepts about polymers, Stereochemistry, thermal behavior and crystal structures of polymers, Molar mass types in polymers and methods for determining the molar mass of polymers, Step polymerization, Addition polymerization, Ionic Polymerization. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines the basic concepts about polymers. | 1b, 1c, 8 | 1, 8 | A |
| **2** | Explains the thermal properties of polymers. | 1b, 1c, 8 | 1, 8 | A |
| **3** | Gains information about the crystal structures of polymers | 1b, 1c, 8 | 1, 8 | A |
| **4** | Recognize the importance of molar mass in polymers. | 1b, 1c, 8 | 1, 8 | A |
| **5** | Learns how to determine the molar masses of polymers | 1b, 1c, 4a, 8 | 1, 8 | A |
| **6** | Explain the differences between polymerization processes. | 1b, 1c, 8 | 1, 8 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Saçak M, Polimer Kimyası, Gazi Kitapevi, 2008. |
| **Other References** | Beşergil, B, Polimer Kimyası, Gazi Kitapevi, 2008. Saçak M, Polimer Teknolojisi, Gazi Kitapevi, 2005. |
| **Tools and Equipment Required** | Computer, Projector, Blackboard. |

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| **COURSE SYLLABUS** | |
| **1** | Basic concepts about polymers |
| **2** | Stereochemistry of polymers |
| **3** | Glass transition temperature |
| **4** | Crystal structure of polymers |
| **5** | Molar mass of polymers |
| **6** | Molar mass types of polymers |
| **7** | Methods for determining the molar mass of polymers |
| **8** | **MIDTERM** |
| **9** | Methods for determining the molar mass of polymers |
| **10** | Stepwise polymerization |
| **11** | Stepwise polymerization kinetics |
| **12** | Radical addition polymerization |
| **13** | Chain reactions |
| **14** | Ionic Polymerization |
| **15** | Ionic Polymerization |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 16 | 16 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Assessment** | | **110** |
|  | **Assessment** | | **3.67** |
|  | **Assessment** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: | 1 |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 5 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Introduction to Energy Technologies | 151616379 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Introducing Energy resources and technologies in the world and Turkey |
| **Course Description** | Energy; fossil energy sources; new and renewable energy sources and technologies; nuclear energy; Environmental impacts of fossil energy and new and renewable energy sources. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Shows the importance and indispensability of energy. | 1b, 1c | 1, 2 | A |
| **2** | Classifies energy sources. | 1b, 1c | 1 | A |
| **3** | Explains new and renewable energy sources. | 6a, 6b, 7a, 10c | 1, 2, 11, 12, 15 | A, G |
| **4** | Explains fossil energy sources. | 6a, 6b, 7a, 10c | 1, 2, 11, 12, 15 | A, G |
| **5** | Discusses the importance of nuclear energy. | 8, 9, 10c | 1, 2, 11, 12, 15 | A, G |
| **6** | Evaluates the environmental impacts of energy resources. | 11 | 1, 2, 11, 12, 15 | A, G |
| **7** | Discusses the changes and developments in energy technologies. | 10c | 1, 2 | A, G |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | 1. Goodger, E.M., Alternative Fuels, The Macmillan Press Ltd, 1980. |
| **Other References** | 1. Klass, D.L., “Biomass for Renewable Energy, Fuels, and Chemicals”, Academic Press, 1998.   2. Kural, O., (Editör), “Kömür” , İTÜ Maden Fakültesi, 1998. |
| **Tools and Equipment Required** | Computer, projector |

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| **COURSE SYLLABUS** | |
| **1** | Energy, World and Türkiye Energy Resources |
| **2** | New and Renewable Energy Sources, Solar |
| **3** | New and Renewable Energy Sources, Wind |
| **4** | New and Renewable Energy Sources, Hydroelectricity |
| **5** | Geothermal |
| **6** | Hydrogen, Biomass |
| **7** | Wave Energy |
| **8** | **MIDTERM** |
| **9** | Fossil Energy Sources, Coal |
| **10** | Coal technology |
| **11** | Petroleum |
| **12** | Natural gas |
| **13** | Nuclear energy |
| **14** | Nuclear Technology |
| **15** | Thermal Processes |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 15 | 3 | 45 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) | 1 | 23 | 23 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 16 | 16 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **150** |
|  | **Total workload / 30** | | **5** |
|  | **Course ECTS Credits** | | **5** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Project Follow up | 30 |
|  |  |
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| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 2 |
| 1. Sufficient basic engineering and chemical engineering knowledge | 2 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 2 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 2 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | 1. a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| 1. b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development | 3 |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Sevgi Şensöz |  |  |  |
| **Signature** |  |  |  |  |

30.07.2022

amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Petroleum Refining and Petrochemical Technology | 151616380 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Emphasizing the importance of petroleum as an energy source, introducing the processes in the refining stages and the petrochemical industry. |
| **Course Description** | Energy, formation, production and composition of petroleum, general principles of petroleum refining, petroleum products and their properties, distillation, cracking, reforming, other recovery processes, auxiliary processes and finishing processes, lubricating oil, wax and asphalt refinery wastes, chemicals used in petroleum refineries and catalysts, petrochemical industry |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1.** | Becomes aware of the importance of oil as a source of energy and raw materials. | 1c, 12 | 1,6 | A,B |
| **2** | Explains the formation, production and composition of petroleum. | 1c, 6b | 1, 6, 12 | A,B,D |
| **3** | Explains the refining processes applied to petroleum. | 1c, 6a, 6b | 1, 6, 12 | A,B,D |
| **4** | Recognizes petroleum products. | 1c, 6b | 1, 6, 12 | A,B,D |
| **5** | Aware of the chemicals and catalysts used in oil refineries | 1c, 6b, 11 | 1, 6, 12 | A,B,D |
| **6** | Knows the petrochemical industry. | 1c, 6b | 1, 6, 12 | A,B,D |
| **7** | Knows the basic criteria for establishing a refinery. | 1c, 6b, 11 | 1, 6, 12 | A,B,D |
| **8** | Prepares and presents reports while preparing a project. | 6b, 7a, 7c, 7d | 12, 15 | D, E, G |
| **9** |  |  |  |  |
| **10** | . |  |  |  |

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| **Textbook** | Kuleli, Ö., “ Petrol Arıtımı Teknolojisi” , Çağlayan Kitabevi, İstanbul, 1981. |
| **Other References** | Beşergil, B., “ Ham Petrolden Petrokimyasallara El Kitabı “,Petkim Yayınları.Beşergil, B., “Rafineri Prosessleri “ ,Ege Üniv. Basım evi ,İzmir,2009.Beşergil, B., “Petrokimya Teknolojisi” Ege Üniv. Basım evi ,İzmir, 2009. |
| **Tools and Equipment Required** | Computer, projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Energy Resources |
| **2** | Crude Oil as an Energy Source |
| **3** | Formation, Production and Composition of Petroleum |
| **4** | General Principles of Petroleum Refining |
| **5** | Petroleum Products and Properties |
| **6** | Distillation |
| **7** | Shredding |
| **8** | **MIDTERM** |
| **9** | Reforming and Other Improvement Processes |
| **10** | Reforming ve Diğer İyileştirme Süreçleri |
| **11** | Auxiliary Processes and Finishing Processes |
| **12** | Lubricating Oil, Wax and Asphalt, Refinery Waste |
| **13** | Petrochemical industry |
| **14** | Reforming and Other Improvement Processes |
| **15** | Reforming and Other Improvement Processes |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 15 | 3 | 45 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) | 1 | 23 | 23 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 16 | 16 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **150** |
|  | **Total workload / 30** | | **5** |
|  | **Course ECTS Credits** | | **5** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | 10 |
| Homework | 10 |
|  |  |
|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 1 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 1 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 2 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Sait Yorgun |  |  |  |
| **Signature** |  |  |  |  |

27/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Hydrogen Energy and Fuel Cells | 151616381 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | Discussing the requirement reasons, production methods, the property of alternative fuel of hydrogen the situation among the other energy sources and the utilization fields of hydrogen. Giving information about fuel cells |
| **Course Description** | Advantages of hydrogen energy, hydrogen production methods, storage and transport of hydrogen, applications of hydrogen energy, working principles and advantages of a fuel cell, types of fuel cells, application of fuel cells |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Classifies energy types. | 1c | 1 | A |
| **2** | Discusses the place of hydrogen energy among other energy sources. | 1c | 1 | A |
| **3** | Explains hydrogen production methods. | 1c | 1 | A |
| **4** | Explains hydrogen storage methods. | 1c | 1 | A |
| **5** | Defines the types of fuel cells. | 1c | 1 | A |
| **6** | Explains the application areas of fuel cells. | 1c | 1 | A |
| **7** | Prepares and presents reports during project preparation. | 6b, 7a, 8, 12 | 1 | D |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** | - |  |  |  |

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| **Textbook** | Şahin, M., Hidrojen Enerjisi Teknolojileri, Anıl Yayınevi, Ankara, 2006 |
| **Other References** | 1. Noyan, Ö. M., Geleceğin Enerjisi: Güneş-Hidrojen, Kaynak yayınları, İstanbul,2001 (Bockris, J. O. M, Veziroğlu, T. N., Smith, D. L çevirisi). 2. Padro, C. E. G., Lau, F., Advances in Hydrogen Energy, Kluwer Academic/Plenum, 2000. 3. Hoffmann, P., Tomorrow’s Energy: Hydrogen, Fuel Cells and the Prospects for a Cleaner Planet, Cambridge, MIT Pres, 2001. 4. Acaroğlu, M, Alternatif Enerji Kaynakları, Atlas yayın dağıtım, 2003. |
| **Tools and Equipment Required** | Computer, projector. |

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| **COURSE SYLLABUS** | |
| **1** | Energy Types and Hydrogen Energy |
| **2** | The Place and Importance of Hydrogen Energy Among Other Energy Sources |
| **3** | Properties of Hydrogen and Usage Areas of Hydrogen Energy |
| **4** | Safety in Hydrogen Use |
| **5** | Hydrogen Energy Production Methods |
| **6** | Storage and Transport of Hydrogen Energy |
| **7** | Applications of Hydrogen Energy |
| **8** | **MIDTERM** |
| **9** | Working Principle of Fuel Cells |
| **10** | Fuel Cells Types |
| **11** | Applications of Fuel Cells in the world and in Turkey |
| **12** | Competitiveness of Hydrogen Energy |
| **13** | Project Presentation |
| **14** | Project Presentation |
| **15** | Project Presentation |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 11 | 2 | 22 |
| Homework | 1 | 20 | 20 |
| 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 | 1 | 18 | 18 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **122** |
|  | **Total workload / 30** | | **4.06** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | - |
| Project | 20 |
| Homework |  |
|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

9/9/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Water Technology | 151616362 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 1 | - | 2 | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To give knowledge about the properties of water and water treatment methods; to teach the desired properties of drinking, utility and industrial waters; to give knowledge about disinfection and industrial water preparation |
| **Course Description** | Properties of water; physical purification; chemical purification; industrial water; boiler water; cooling water; irrigation water; swimming pool water; drinking and utility waters; disinfection; corrosion; water quality standards; toxic materials. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Remembers the physical and chemical properties of water. | 1c, 1d | 1 | A |
| **2** | Remembers water purification methods. | 1c, 1d | 1 | A, D |
| **3** | Clarifies the properties of various waters used in industry. | 1c | 1 | A, D |
| **4** | Explains disinfection. | 1c | 1 | A, D |
| **5** | Explains corrosion. | 1c | 1 | A, D |
| **6** | Prepares and submits the homework. | 1c, 6b, 7a, 8 | 12, 15 | D, G |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Yalçın, H., Gürü, M., Su Teknolojisi, Palme Yayınları, Ankara, 2002 |
| **Other References** | 1. Hammer, M.J., Hammer Jr., M.J., Water and Wastewater Technology, 3rd edition, Prentice Hall, New Jersey, 1996.  2. Morelli, C. D., Basic Principles of Water Treatment, Tall Oaks Publishing, Colorado, 1996.  3. Cheremisinoff, N.P., Handbook of Water and Wastewater Treatment Technologies, Butterworth-Heinemann, UK, 2002. |
| **Tools and Equipment Required** | Computer, projector, classroom with curtains. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, the aim and the content of the course |
| **2** | Physical properties of water |
| **3** | Chemical properties of water |
| **4** | Physical purification |
| **5** | Physical purification |
| **6** | Chemical purification |
| **7** | Chemical purification |
| **8** | **MIDTERM** |
| **9** | Industrial water, boiler feeding water, cooling water |
| **10** | Irrigation water, swimming pool water |
| **11** | Drinking and utility waters |
| **12** | Disinfection, corrosion |
| **13** | Water quality standards, toxic materials |
| **14** | Homework Presentations |
| **15** | Homework Presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 15 | 15 |
| 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 | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **111** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 20 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. İlker KIPÇAK |  |  |  |
| **Signature** |  |  |  |  |

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Engineering Mechanics | 151616376 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To present basic information about mechanics (static and dynamic), to give examples of engineering applications and to form the basis for other related courses. |
| **Course Description** | Mechanics and general principles, concept of force and statics of material points, force system components, balance of rigid bodies, friction, centers of gravity, moments of inertia, forces in beams, structural analysis, basic principles of dynamics, kinematics of material points, kinetics of material points; dynamic balance, work-energy principle, power and impulse-momentum. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Realizes the importance of mechanics in engineering applications. | 1c | 1, 6 | A |
| **2** | Explains the basic concepts and laws in mechanics. | 1c | 1, 6 | A |
| **3** | Calculates the reactions at the supports using static equilibrium conditions. | 1c | 1, 6 | A |
| **4** | Draws shear force and bending moment diagrams. | 1c | 1, 6 | A |
| **5** | Calculates the center of gravity and moment of inertia of compound objects. | 1c | 1, 6 | A |
| **6** | Solves the balance problems of moving objects. | 1c | 1, 6 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Mühendislik Mekaniği – Statik, R.C. Hibbeler ve S.C. Fan, (Çev.: A. Soyuçok ve Ö. Soyuçok), 2005, Literatür Yayınevi. |
| **Other References** | 1.Engineering Mechanics: Statics & Dynamics, A. Pytel and J. Kiusalaas, 1996, HarperCollins College Publishers.  2.Mühendisler için Mekanik: Statik, F.P. Beer ve E.R. Johnston, Birsen Yayınevi  3.Mühendisler için Mekanik: Dinamik, F.P. Beer ve E.R. Johnston, Birsen Yayınevi  4.Mühendislik Mekaniği – Dinamik, R.C. Hibbeler, (Çev.: A. Soyuçok ve Ö. Soyuçok), 2004, Literatür Yayınevi. |
| **Tools and Equipment Required** | - |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Mechanics: basic concepts and laws, units-magnitudes, vector operations, the concept of resultant force and the balance of material points. |
| **2** | Applications of the statics of material points, moments of forces, Varignon's theorem. |
| **3** | Applications of force system components and balance of rigid bodies. |
| **4** | Equilibrium applications of rigid bodies and friction. |
| **5** | Friction topics and applications. |
| **6** | Distributed forces: Centers of gravity; subjects and applications. |
| **7** | Distributed forces: Moments of inertia; subjects and applications. |
| **8,9** | **MIDTERM** |
| **9** | Forces in beams: Shear force and bending moment; subjects and applications. |
| **10** | Forces in beams: Shear force and bending moment; subjects and applications. |
| **11** | Structural analysis: Simple truss systems; subjects and applications. |
| **12** | Kinematics of material points; subjects and applications. |
| **13** | Kinetics of material points; subjects and applications. |
| **14** | Kinetics of material points; subjects and applications. |
| **15** | Kinetics of material points; subjects and applications. |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 3 | 30 |
| 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** | | **110** |
|  | **Total workload / 30** | | **3.67** |
|  | **Course ECTS Credits** | | **4** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Credit** | **ECTS** |
| Statistics | 151616377 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 | - | - | 1 | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Introducing the basic topics of statistics in interpreting experimental results and solving problems related to scientific and industrial studies and making applications related to this field. |
| **Course Description** | Statistics and its definition, basic concepts, preparation of statistical information for analysis, measures of central tendency, averages; dispersion measures, unimodal symmetric distributions; sampling, statistical decision theory, hypothesis testing, and the chi-square test of significance. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines and classifies statistics and basic concepts. | 1a | 1,6 | A |
| **2** | Prepares and uses statistical information for analysis. | 1a | 1,6 | A |
| **3** | Define, explain, and relate measures of central tendency and averages. | 1a | 1,6 | A |
| **4** | Defines, solves and relates dispersion measures and unimodal symmetric distributions. | 1a | 1,6 | A |
| **5** | Defines, solves and relates sampling, statistical decision theory. | 1a | 1,6 | A |
| **6** | Defines, solves and interprets hypothesis tests and significance. | 1a | 1,6 | A |
| **7** | Defines, solves and interprets the chi-square test. | 1a | 1,6 | A |
| **8** | Prepares and presents his homework. | 1a, 8 | 12 | A, D |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Bağırkan, Ş. “İstatistiğe Giriş”, Bilim Teknik Yayınevi, 1991. |
| **Other References** | 1.Çömlekçi, N., “Temel İstatistik”, Bilim Teknik Yayınevi, 1998.  2.Gündüz, T., “Kimyacılar İçin İstatistik”, Gazi Kitabevi, 1998.  3. Spiegel, M. R., “İstatistik”, Bilim Teknik Yayınevi, Çeviri, 1995. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Statistics and its Definition |
| **2** | Basic concepts |
| **3** | Preparing Statistical Information for Analysis |
| **4** | Measures of Central Tendency, Means |
| **5** | Dispersion Measures |
| **6** | Unimodal Symmetric Distributions |
| **7** | Unimodal Symmetric Distributions |
| **8** | **MIDTERM** |
| **9** | Sampling |
| **10** | Sampling |
| **11** | Statistical Decision Theory |
| **12** | Hypothesis Testing and Significance |
| **13** | Chi-Square Test |
| **14** | Binomial Expansion |
| **15** | Binomial Expansion |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 21 | 20 |
| Homework | 1 | 10 | 10 |
| 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 | 1 | 7 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 10 | 2 | 20 |
|  | **Total workload** | | **89** |
|  | **Total workload / 30** | | **2.96** |
|  | **Course ECTS Credits** | | **3** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | 15 |
|  |  |
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| **Semester final exam** | 50 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 5 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| German II | 151616364 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Theory** | **Practice** |
| **Theory** | **Practice** |
| 6 | 2 | 0 | 2 | 2 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | - | 2 |

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| **Course Language** | **Course Level** | **Course Type** |
| German | Undergraduate | Elective |

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| **Prerequieite(s)** | - |
| **Course Objectives** | It is a course developed to teach the concepts of time, forming sentences, and understanding and responding to what is being said at the beginning level of German. |
| **Course Description** | Introduction to German grammar. |

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| **Textbook** | | **Textbook** | **Textbook** | **Textbook** |
| **1** | Defines basic German grammar rules. | 7b | 1, 5 | A |
| **2** | Analyzes German dialogues. | 7b | 1, 5 | A |
| **3** | Explains a text in simple German. | 7b | 1, 5 | A |
| **4** | Communicates in written and verbal German. | 7b | 1, 5 | A |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Schulz-Griesbach: Deutsche Sprachlehre für Auslaender |
| **Other References** | 1. G. Mahler und R Schmitt: Wir lernen Deutsch  2. Dreyer-Schmitt: Lehr- und Übungsbuch der deutschen Grammatik  3. E. Frangou und E. Kokkini: Grammatikland, Band 1 und 2 |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Praepositionen mit dem Dativ |
| **2** | Praepositionen mit dem Akkusativ |
| **3** | Zeitadverb, Wortstellung |
| **4** | Modalverben, Modalsatz |
| **5** | Die Uhrzeiten, Demonstrativpronomen |
| **6** | Personalpronomen im Akkusativ |
| **7** | Personalpronomen im Dativ |
| **8** | **MIDTERM** |
| **9** | Wortstellung, Übungen |
| **10** | Wortstellung, Übungen |
| **11** | Frageadverbien |
| **12** | Wechselpraepositionen |
| **13** | Der Genitiv |
| **14** | Das Praeteritum |
| **15** | Das Praeteritum |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 5 | 5 |
| Semester final exam | 1 | 1,5 | 1,5 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **55** |
|  | **Total workload / 30** | | **1.83** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

15/6/2022

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Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**C****OURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| English Oral Communication | 151616365 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 2 | 0 | 2 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | - | 2 |

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| **Course Language** | **Course Level** | **Course Type** |
| English | Undergraduate | Elective |

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| **Prerequieite(s)** | - |
| **Course Objectives** | To improve students' English speaking skills. |
| **Course Description** | Students are taught conversations that they can use in daily life.  Students' presentation skills are improved. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Memorizes the speech forms he/she has learned. | 7b | 1, 5 | A |
| **2** | Retells the dialogues he/she has learned according to his own expression. | 6a, 7b | 1, 11, 12 | A |
| **3** | Uses the speaking skills he/she has learned abroad. | 6a, 7b, 8 | 1, 11, 6 | A |
| **4** | Uses the presentation skills he/she has learned in business life. | 4b, 6a, 7b | 8, 11, 15 | G |
| **5** | Distinguishes the structures he/she learned from different dialogues | 6a, 7b | 11 | A |
| **6** | Establishes dialogues appropriate to new situations by using the structures learned from different dialogues. | 6a, 7b, 8 | 6 | A |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | National Geographic Learning&Cengage Learning-Life Series |
| **Other References** | - |
| **Tools and Equipment Required** | Computer, projector, speakers. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction |
| **2** | Talking about interest / making arangements |
| **3** | Inviting/AcceptingXDeclining invitations |
| **4** | Travelling around the city and at tourist info |
| **5** | Talking about illnesses and making suggestions |
| **6** | Examples of dialogue completion and situation |
| **7** | Presentation skills and an example presentation |
| **8** | **MIDTERM** |
| **9** | Presentation skills and an example presentation |
| **10** | Students’ presentations (4 students) |
| **11** | Students’ presentations (4 students) |
| **12** | Students’ presentations (4 students) |
| **13** | Students’ presentations (4 students) |
| **14** | Students’ presentations (2 students) |
| **15** | Students’ presentations (2 students) |
| **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) | 2 | 2 | 4 |
| Class Study time (revision, reinforcement, pre-study,….) | 2 | 1 | 2 |
| 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) | 1 | 48 | 48 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 5 | 5 |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | | **60** |
|  | **Total workload / 30** | | **2** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
|  |  |
|  |  |
|  |  |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge | 5 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

26/7/2022

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Açıklama otomatik olarak oluşturuldu**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Interpersonal Communication | 151616366 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 2 | 0 | 2 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | - | 2 |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | The aim of this course is for students to acquire information that they can use in the processes of listening, speaking and conveying their thoughts about the individuals they encounter in their daily lives. In addition, it is aimed to ensure that students acquire the skills of preparing and making effective presentations, writing effective business articles, preparing CVs for business life, and gaining persuasion and crisis management skills in the interpersonal communication process. |
| **Course Description** | Communication, basic components of communication, types of communication, communication barriers, effective presentation techniques, CV preparation, business writing, persuasion process, crisis management. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1.** | Definies communication | 7a | 1, 5 | A |
| **2.** | Knows the basic components of communication | 7a | 1, 2, 5 | A |
| **3.** | Designs applications to demonstrate verbal, written and non-verbal communication skills | 6b, 7a, 8 | 1, 2, 5, 6, 7, 12, 15 | A, D, E, G |
| **4.** | Identifies factors and problems in the communication process | 6b,7a, 8, 12 | 1, 2, 5, 7 | A, D, E, G |
| **5.** | Uses effective presentation techniques | 4b, 6b, 7a, 8 | 1, 2, 5, 6, 12, 15 | A, D, E, G |
| **6.** | Writes effective business articles | 4b, 7a, 8 | 1, 2, 5 | D |
| **7.** | CV preparation | 4b, 6a, 7a, 8 | 1, 2, 5, 6, 11, 15 | A, D, E, G |
| **8.** | Gains skills in persuading people | 7a, 8, 9 | 1, 2, 5 | A |
| **9.** | Knows techniques for dealing with crisis situations | 7a, 8, 9 | 1, 2, 5 | A |

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| --- | --- |
| **Textbook** | Baltaş, A. ve Baltaş, Z. (2015). Bedenin dili. İstanbul: Remzi.  Harvard Business Review . (2008). Etkin iletişim. İstanbul: Optimist.  İzgören, A. Ş. (2016). Dikkat vücudunuz konuşuyor. Ankara: Elma. |
| **Other References** | Dökmen, Ü. (2016). Sanatta ve günlük yaşamda iletişim çatışmaları ve empati. İstanbul: Remzi. |
| **Tools and Equipment Required** | Projection and computer |

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| **COURSE SYLLABUS** | |
| **1** | Information about the course content and student responsibilities |
| **2** | Communication concept |
| **3** | Elements of communication |
| **4** | Types of communication (verbal, written and non-verbal communication) |
| **5** | Types of communication (verbal, written and non-verbal communication) |
| **6** | Interpersonal communication obstacles |
| **7** | Interpersonal communication obstacles |
| **8** | **MIDTERM** |
| **9** | Effective presentation techniques |
| **10** | Effective presentation techniques |
| **11** | Effective business writing |
| **12** | CV preparation techniques |
| **13** | Process of convincing people |
| **14** | Crisis management |
| **15** | Crisis management |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 0.5 | 7 |
| Homework | 4 | 1 | 4 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 4 | 2 | 8 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) | 4 | 2 | 8 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 3 | 3 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 3 | 3 |
|  | **Total workload** | | **63** |
|  | **Total workload / 30** | | **2.1** |
|  | **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Homework | 30 |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 2 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 1 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 2 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 4 |
| **9** | 1. a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| 1. b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

17/8/2022

amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu****

**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Intellectual & Industrial Property Rights | 151616368 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 2 | - | 2 | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | 2 | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To ensure that students understand the basic concepts of Intellectual and Industrial Property rights in Turkey and in the world and the theoretical basis of these concepts and to raise awareness in the field of Industrial Property. Within the scope of this course, where the reasons and legal foundations of protection of Intellectual and Industrial Property will be examined, topics such as the emergence of new technologies, their effects on traditional law and lifestyles, business methods being subject to patent rights, and violation of copyright due to data sharing will be covered. Undergraduate graduates who take this course can take the exams held by the Turkish Patent Institute and have the opportunity to work freelance in the market as a Patent attorney and/or Trademark attorney. |
| **Course Description** | This course is a general introduction to the Intellectual and Industrial Property Rights existing in the field of Patents and copyrights. In the course, the conditions under which and how Intellectual and Industrial Property Rights will be obtained, the importance of using the patent database, technological developments and legislation will be explained visually and theoretically and supported with various applications. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Becomes aware of Intellectual and Industrial Property Rights. | 8, 9 | 1,2,4,5 | A |
| **2** | Knows how to benefit from Intellectual and Industrial Property Rights. | 9 | 1,2,4,5,6 | A |
| **3** | Knows how to apply for a patent and the process. | 10b | 1,3,5,6 | A |
| **4** | Produces solutions by researching patent databases. | 9, 10b | 1,2,3,5,6,8,10 | A |
| **5** | Generates entrepreneurial ideas from the patent database. | 10b | 1,5,6,8,10 | A |
| **6** | Learns the process to apply to TPI in the fields of trademark, industrial design, etc. rights related to registration. | 9 | 1,4,5,6 | A |
| **7** | Knows how to protect copyrights and registered rights. | 9 | 1,2,3,4,5,6 | A |
| **8** | Becomes aware of how to commercialize ideas within the scope of Intellectual Industrial Rights. | 8, 10b | 1,4,5,8 | A |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Fikri Mülkiyet Hukukunun Esasları – Prof. Sami Karahan, Av.Cahit Suluk |
| **Other References** | Bozkurt, A.E. (2010) Dünya Fikri Mülkiyet Örgütü (WIPO) Tahkim Sistemi  Özcan, M. (1999) Avrupa Birliğinde Fikri ve Sınaî Haklar  Beşiroğlu, A. (2006) Fikir Hukuku Dersleri |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Science and Technology Policies, Introduction to Intellectual Property Rights |
| **2** | What are Copyrights and Industrial Property Rights and how are they obtained? |
| **3** | Creating a brand, registering a brand |
| **4** | What is a patent, a utility model, how to apply |
| **5** | How to write a patent database preliminary search, specification and claims |
| **6** | Technology transfer using the patent database |
| **7** | How patents are commercialized |
| **8** | **MIDTERM** |
| **9** | Industrial Design, research and application |
| **10** | Industrial Design, research and application |
| **11** | Integrated Circuit Topography, research and reference |
| **12** | Geographical Indications application and international protection |
| **13** | Registration procedures and intellectual protection for New Technologies and New Plant Varieties |
| **14** | Protection of trade secrets |
| **15** | Use of quality standards and signs |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 5 | 5 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **54** |
|  | **Total workload / 30** | | **1.8** |
|  | **Course ECTS Credits** | | **2** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
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|  |  |
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| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 4 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation | 4 |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

14/7/2022

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Açıklama otomatik olarak oluşturuldu**

**ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Chemical Reaction Engineering II | **151616326** |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 6 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | To educate students in a way that they can describe and analyze chemical reactions encountered both in daily life and in chemical engineering, and to develop their understanding of basic chemical reaction engineering. |
| **Course Description** | Thermodynamics of chemical reactions; kinetics of homogeneous reactions; interpretation of batch reactor data; complex reactive systems; ideal batch reactors. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines homogeneous reactions. | 1d | 1, 2, 5, 10 | A, B |
| **2** | Derives performance equations for batch reactors using energy and mass balances. | 1d, 2 | 1, 2, 5,10 | A, B |
| **3** | Determines the reaction rate expression by analyzing experimental data in fixed and variable volume systems. | 1d, 2 | 1, 2, 5, 10 | A, B |
| **4** | Analyzes the effect of temperature and pressure on the reaction rate. | 1d, 2 | 1, 2, 5,10 | A, B |
| **5** | Solve engineering problems using different methods. | 1d, 2 | 1, 2, 5,10 | A, B |
| **6** | - | - | - | - |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| --- | --- |
| **Textbook** | Levenspiel, O. “Chemical Reaction Engineering”, John Wiley, New York, 1999 |
| **Other References** | 1. Basan, S.., “ Temel Kimyasal Tepkime Mühendisliği”, Gazi Kitabevi, , 2010.  2. Smith, J. M. , “Chemical Engineering Kinetics” , McGraw Hill, London, 1981.  3. Cooper, A. R. and Jeffreys, G. V., “Chemical Kinetics and Reactor Design”, Birmingham, U.K, 1971.  4. Fogler, H. S., “Elements of Chemical Reaction Engineering”, Prentice-Hall International Inc., 1999 (3. Basım). |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Explaining the Grading Policy Applied to the Course, the Purpose and Content of the Course, Introduction to Reactor Design |
| **2** | Isothermal reactor design, Singular Ideal Reactors - Steady State Stirred Reactor - Steady State Piston Flow Reactor |
| **3** | Design for Single Reactions - Stirred and Piston Flow Reactors for First and Second Order Reactions - General Graphical Comparison |
| **4** | Multiple reactor systems: Series and Parallel Piston Flow Reactors-Series Equal Volume Stirred Reactors |
| **5** | Pressure drop in packed bed flow |
| **6** | Multiple reactions; Chain, parallel, complex and independent, efficiency and selectivity |
| **7** | Design for parallel reactions: Product distribution for parallel reactions, Best operating conditions for parallel reactions |
| **8** | **MIDTERM** |
| **9** | Steady-state dynamic reactor design, Energy balances |
| **10** | Steady-state dynamic reactor design, Energy balances |
| **11** | Adiabatic operation-Tubular reactors and Stirred Reactors |
| **12** | Sıcaklık ve Basıncın Etkisi- Genel Grafiksel Tasarım Yöntemi |
| **13** | Determining the Best (Optimum) Temperature - Adiabatic Processes Non-Adiabatic Processes |
| **14** | Introduction to heterogeneous reaction systems |
| **15** | Introduction to heterogeneous reaction systems |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz | 2 | 1 | 2 |
| Quiz preparation | 2 | 3 | 6 |
| 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 | 15 | 15 |
| Semester final exam | 1 | 1,5 | 1,5 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **116** |
|  | **Total workload / 30** | | **3.86** |
|  | **Course ECTS Credits** | | **4** |
| **Assessment** | | | |
| **Semester activities** | **%** | | |
| Midterm | 35 | | |
| Quiz | 20 | | |
| Homework |  | | |
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| **Semester final exam** | 45 | | |
| **Total** | 100 | | |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **NO** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 5 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 5 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

1/7/2022

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**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Chemical Engineering Laboratory II | 151617427 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 0 | 4 | 2 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | - | - |

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

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| --- | --- |
| **Prerequieite(s)** | Separation processes |
| **Course Objectives** | To provide students with the ability to design experiments, to give them the ability to use basic engineering equipment and measurement devices reliably, to provide them with the ability to analyze and interpret experimental data as a member of a group, and to prepare the experiment report. |
| **Course Description** | Cross-flow heat exchanger, double-pipe heat exchanger, solid-liquid extraction, distillation, gas adsorption in packed column, tray dryer, diffusion experiment |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Makes experimental design in accordance with the purpose of the experiment. | 5a | 3, 12, 15 | C, E |
| **2** | Specifies the purpose of the experiment, experimental parameters and test method. | 1d, 4a, 5b | 2, 5 | B, C, E |
| **3** | Collects data by conducting experiments and analyzes the data. | 5b, 6b | 2, 3, 12 | E, I |
| **4** | Presents experimental results using appropriate graphs, tables and figures. | 4b, 5b, 6b, 7a | 12, 15 | E |
| **5** | Discusses the experimental results. | 5b, 7a | 3, 5, 7, 15 | C, E |
| **6** | Reports the experimental study in accordance with the rules. | 6b,7a | 12, 15 | E |
| **7** | Takes an active role within the team in the execution and reporting of the experiment. | 5b, 6b | 3, 12, 15 | E, I |
| **8** | Relates engineering facts, events and situations with experiments | 1d, 5b | 2, 5 | B, C, E |
| **9** | Recognizes the importance of professional and ethical responsibility. | 9a | 1 | E |
| **10** | Knows laboratory safety and can apply its rules. | 11 | 1 | I |

|  |  |
| --- | --- |
| **Textbook** | Kimya Mühendisliği Laboratuvarı I-II-III Deney Kılavuzu (Ed: M. E. Yıldırım) ESOGÜ Yayınları, No:167, 2009 |
| **Other References** | 1. Stephanopoulos, G., “Chemical Process Control”, Prentice-Hall, Englewood Cliffs, ew Jersey, 1983.  2. McCabe, W. L., Smith, J. C., Harriott, P., “Unit Operations of Chemical Engineering”, 7th edition, McGraw-Hill, New York, 2005.  3. Levenspiel, O., “Chemical Reaction Engineering”, Wiley Int, New York, 1972. Perry, R. H., “Perry's Chemical Engineering Handbook”, 6th edition, McGraw-Hill, New York, 1984. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **Dersin Haftalık Planı** | |
| **1** | Creating group lists |
| **2** | Laboratory safety training and course introduction |
| **3** | Cross flow heat exchanger |
| **4** | Double tube heat exchanger |
| **5** | Solid-liquid extraction |
| **6** | Distillation |
| **7** | Gas adsorption in packed column |
| **8** | **MIDTERM** |
| **9** | Diffusion experiment |
| **10** | Tray dryer |
| **11** | Design experiments |
| **12** | Design experiments |
| **13** | Make-up experiments |
| **14** | Make-up experiments |
| **15** | Make-up experiments |
| **16,17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 8 | 4 | 32 |
| Class Study time (revision, reinforcement, pre-study,….) |  |  |  |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation | 7 | 2 | 14 |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 7 | 15 | 105 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | | **151** |
|  | **Total workload / 30** | | **5.03** |
|  | **Course ECTS Credits** | | **5** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Quiz | 30 |
| Oral Exam | 30 |
| Raport | 40 |
|  |  |
|  |  |
| **Semester final exam** |  |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **NO** | **PROGRAM ÇIKTISI** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 2 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 4 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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

16/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Preparation for Engineering Researches | 151617653 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 2 | 0 | 2 | 3 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 1 | 1 | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | 1.-6. 90% of the semester's courses must be taken. |
| **Course Objectives** | Establishing the infrastructure of the project that the student will do in the Engineering Research course that he will take in the 8th semester, under the supervision of a faculty member. |
| **Course Description** | Carrying out theoretical studies on the project of the Engineering Research course that the student will take in the following semester, selecting the experimental study method, making the necessary preliminary preparations, and preparing a report. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Realizes the importance of the work area. | 8 | 1, 2, 5 | C, E, L |
| **2** | Examines, collects, explains and discusses literature related to the field of study. | 4b, 6a, 7b, 8 | 11 | E, L |
| **3** | Uses and applies previous knowledge to the field of work. | 1d, 6a | 1, 2, 5, 12, 14, 15 | C, E, L |
| **4** | Designs experiments on the Project. | 5a, 6b | 12, 14 | C, E, L |
| **5** | Combines the study results, interprets, evaluates, discusses and finally organizes, presents and defends them in written form.  ​ | 6b, 7a, 7c, 7d, 9a | 2, 11, 12, 15 | E, L |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Books, periodicals, theses, internet resources related to the subject to be studied. |
| **Other References** | Books, periodicals, theses, internet resources related to the subject to be studied. |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Definition of scientific research. Scientific research process and stages. Informational presentation on literature review and review and citation. |
| **2** | Informational presentation on preparing a research report, finalizing scientific research (reporting, thesis, oral presentation, project preparation) |
| **3** | Discussion About the Subject and Determination of the Study Subject |
| **4** | Scientific Source Research on the Subject |
| **5** | Scientific Source Research on the Subject |
| **6** | Scientific Source Research on the Subject |
| **7** | Scientific Source Research on the Subject |
| **8** | **MIDTERM** |
| **9** | Evaluating Research Results, Selecting the Experiment Method and Designing the Experiment |
| **10** | Evaluating Research Results, Selecting the Experiment Method and Designing the Experiment |
| **11** | Preparations for Experimental Study |
| **12** | Preparations for Experimental Study |
| **13** | Discussing and writing the study report |
| **14** | Discussing and writing the study report |
| 15 | Discussing and writing the study report |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | - | - | - |
| Quiz | 1 | 1 | 1 |
| Quiz preparation | 1 | 1 | 1 |
| Oral Exam | 1 | 1 | 1 |
| Oral Exam prep | 1 | 1 | 1 |
| Report (including preparation and presentation time) | 1 | 1 | 1 |
| Project (including preparation and presentation time) | 1 | 10 | 10 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 5 | 5 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | **76** |
|  | **Total workload / 30** | | **2.73** |
|  | **Course ECTS Credits** | | **3** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Quiz | 10 |
| Report (midterm report) | 30 |
|  |  |
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|  |  |
| **Semester final exam** | 60 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 2 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems:   1. skill of using information technologies effectively |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 2 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects:   1. skill of experimental design 2. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 2 |
|  |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 2 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 2 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 2 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 3 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 2 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Design in Chemical Engineering I | **151617635** |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 2 | 4 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | 4 | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Separation Processes |
| **Course Objectives** | To provide application of theoretical principles gained this course and other courses, and to get equipment design experience, benefit from related software by preparing project. To stimulate disciplinary teamwork and get this skill to the students. |
| **Course Description** | Equipment design used in chemical engineering process (computer aided): project studies about material transfer equipment design, heat transfer equipment design, and separation column design, the use of appropriate software (such as CHEM-CAD) for design, steps of process design, development of design project and preparation of flow chart. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Calculates, designs and selects some devices used in chemical processes to perform the desired task. | 2, 3 | 1, 6, 12,14 | A, J |
| **2** | Recognizes the importance of safety, ethical and environmental constraints and conditions in device design. | 3, 9a, 11 | 1, 12, 14 | J |
| **3** | Conducts cost analysis in device design and selects the most suitable one. | 3 | 1, 6, 12, 14 | J |
| **4** | Uses appropriate software in device design. | 3 | 1, 6, 12, 14 | J |
| **5** | Works as a team while preparing device design projects, prepares and presents reports. | 3, 6b, 7c, 7d, 8, 9a | 12, 14, 15 | J |
| **6** | Knows the steps of chemical process design and uses it in project development. | 3 | 1 | A |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| --- | --- |
| **Textbook** | Sinnot, R., Towler, G., “Chemical Engineering Design”Fifth edition, Elsevier, USA, 2009. |
| **Other References** | 1.Peters, M. S., Timmerhaus, K. D., Plant Design and Economics for Chemical Engineers , McGraw Hill, New York, 2003.  2. Books on plant design, engineering economics, separation processes, chemical reaction engineering, momentum, heat and mass transfer, thermodynamics and stoichiometry, related standards and regulations. |
| **Tools and Equipment Required** | Computer, projector. |

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| **COURSE SYLLABUS** | |
| **1** | Explaining the Purpose and Content of the Course; Introduction to Design |
| **2** | Design of Devices Used to Transport Materials |
| **3** | Design of Devices Used to Transport Materials |
| **4** | Design of Devices Used to Transport Materials |
| **5** | Design of Devices Used to Transport Materials |
| **6** | Design of Devices Used for Transporting Materials and ChemCAD Application |
| **7** | Presentations of the I. Project |
| **8** | **MIDTERM** |
| **9** | Design of Devices Used in Heat Transfer or Design of Some Separation Columns |
| **10** | Design of Devices Used in Heat Transfer or Design of Some Separation Columns |
| **11** | Design of Devices Used in Heat Transfer or Design of Some Separation Columns |
| **12** | Design of Devices Used in Heat Transfer or Design of Some Separation Columns |
| **13** | Design of Devices Used in Heat Transfer or Design of Some Separation Columns and ChemCAD Application |
| **14** | Presentations of the II. Project |
| **15** | Steps of Chemical Process Design |
| **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) | 15 | 5 | 75 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 3 | 30 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) | 2 | 20 | 40 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 15 | 15 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 17 | 17 |
|  | **Total workload** | | **181** |
|  | **Total workload / 30** | | **6** |
|  | **Course ECTS Credits** | | **6** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Exam | 20 |
| Project | 20 |
| Project | 30 |
| **Semester final exam** | 30 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 1 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. | 5 |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge | 1 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 2 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | 1. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| 1. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation | 1 |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Process Control | 151617637 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 4 | 0 | 4 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 | 3 | - | - | - |

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

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| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | Examining the changes in process parameters and modeling processes in steady and unsteady situations and solving possible control problems. |
| **Course Description** | Laplace transforms, response of first order systems, first order systems, higher order systems, linear closed loop systems, control and control power elements, closed loop transfer functions, standard block diagram, response of simple control systems, response to servo and regulator changes, offset value, Response and stability to load and set point changes in controllers. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Expresses the importance of process control. | 1c | 1, 8 | A, B |
| **2** | Explains Laplace transforms. | 1a | 1, 8 | A, B |
| **3** | Defines first and higher order systems. | 1a, 1d | 1, 8 | A, B |
| **4** | Explains linear closed loop systems. | 1c | 1, 8 | A, B |
| **5** | Discusses control and control power elements. | 4a, 11 | 1, 8 | A, B |
| **6** | Calculates closed loop transfer functions. | 1c | 1, 8 | A, B |
| **7** | Analyzes the answer of block diagrams. | 1c | 1, 8 | A, B |
| **8** | Resolves load and setpoint variations in controllers. | 1c | 1, 4, 13 | A, B |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

|  |  |
| --- | --- |
| **Textbook** | Coughannowr, D. R., Koppel, L. B., “Process Systems Analysis and Control”, McGraw-Hill Book Com. 1992. |
| **Other References** | 1. Seborg, D. E., Edgar, T. F., Mellichamp, D. A., “Process Dynamics and Control”, Wiley Series in Chem. Eng., 1989. 2. Luyben, W. L., “Process Modelling Simulation and Control for Chemical Engineering”, McGraw-Hill, 1973. 3. Stephanopoulas, G., “ Chemical Process Control”, Prentice-Hall, New Jersey . |
| **Tools and Equipment Required** | - |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Introduction to Process Control, What is automatic control? What are control systems? |
| **2** | Laplace Transforms |
| **3** | Laplace Transforms |
| **4** | Answer of First Order Systems |
| **5** | Continuation to First Order Systems, Liquid-Level Systems. |
| **6** | Linearization in Liquid Level Systems |
| **7** | Interactive-Non-Interactive Systems in Liquid Level Systems |
| **8** | **MIDTERM** |
| **9** | Higher Order Systems |
| **10** | Linear Closed Loop Systems |
| **11** | Control and Control Power Elements |
| **12** | Closed Loop Transfer Functions |
| **13** | Response to Servo and Regulator Changes |
| **14** | Response to Load and Setpoint Variations in Controllers |
| **15** | Offset in control systems |
| **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 | 1 | 1 | 1 |
| Quiz preparation | 1 | 5 | 5 |
| 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 | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Assessment** | | **136** |
|  | **Assessment** | | **4.53** |
|  | **Assessment** | | **5** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | 15 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 50 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 2 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 4 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems:   1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects:   1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof.Dr.Sevgi ŞENSÖZ | Prof.Dr.Yeliz AŞÇI |  |  |
| **Signature** |  |  |  |  |

11/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Computer Applications in Chemical Engineering | 151617654 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 1 | 2 | 2 | 3 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To provide students with problem solving and design skills using software commonly used in Chemical Engineering. |
| **Course Description** | Solution, design and simulation of problems related to thermodynamics, fluid mechanics, heat transfer, mass transfer, chemical reaction engineering and process control. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Applies knowledge to solve problems. | 1d, 4b | 1, 5, 6 | A, B, D |
| **2** | Decides on appropriate methods for solving problems. | 1d, 4b | 1, 5, 6 | A, B, D |
| **3** | Uses information technologies effectively in problem solving and design. | 1d, 4b | 1, 5, 6 | A, B, D |
| **4** | Designs a system and device in the field of Chemical Engineering. | 1d, 4b | 1, 5, 6 | A, B, D |
| **5** | Decides the best operating conditions of a system or device. | 1d, 4b | 1, 5, 6 | A, B, D |
| **6** | - | - | - | - |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | Ghasem, N., “Computer Methods in Chemical Engineering”, 2012, CRC Press |
| **Other References** | - Finlayson, B., A., “Introduction to Chemical Engineering Computing”, 2. Baskı, 2012, Wiley - Turton, R., vd., “Analysis, Synthesis and Design of Chemical Processes”, 4. Baskı, 2012 Pearson Education |
| **Tools and Equipment Required** | A computer per student |

|  |  |
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| **COURSE SYLLABUS** | |
| **1** | Introduction to Chemcad software |
| **2** | Examination of thermodynamic models in Liquid-Vapor Equilibrium system |
| **3** | Mass balance in recirculating systems |
| **4** | Pipeline simulation |
| **5** | Heat Exchanger simulation |
| **6** | Equilibrium reaction simulation in a batch reactor |
| **7** | Fully Stirred Continuous reactor simulation |
| **8** | **MIDTERM** |
| **9** | Piston Flow Reactor simulation |
| **10** | Distillation Column simulation |
| **11** | Process Control simulation |
| **12** | Process simulation |
| **13** | Process simulation |
| **14** | Process simulation |
| **15** | Process simulation |
| **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 | 3 | 52 |
| Class Study time (revision, reinforcement, pre-study,….) | - | - | - |
| Homework | 2 | 5 | 10 |
| 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 | 1 | 5 | 5 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 5 | 5 |
|  | **Total workload** | | 76 |
|  | **Total workload / 30** | | 2.53 |
|  | **Course ECTS Credits** | | **3** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Homework | 20 |
|  |  |
|  |  |
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| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **NO** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 5 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 5 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Fuel Technology | 151617640 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Emphasizing the importance of energy and making people understand its indispensability; learning the structure, composition and properties of solid, liquid and gaseous fuels; Examining the conversion techniques applied to coal and biomass and understanding their importance. |
| **Course Description** | Introduction and Basic Concepts, Solid Fuels, Liquid Fuels, Gas Fuels. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Realizes the importance of energy and its efficient use and the indispensability of energy. | 6a, 7a, 9b, 11 | 1,11,15 | A,F,G |
| **2** | Explains and classifies energy sources; discusses their differences. | 11 | 1 | A |
| **3** | Analyzes the problems of using fossil resources. | 1c, 6a, 7a, 9b, 11 | 1,11,15 | A,F,G |
| **4** | Classifies, explains and discusses alternative energy sources; Realizes its importance and contribution to sustainability, and explains its differences with fossil resources. | 1c, 7a, 9b | 1,11,15 | A,F,G |
| **5** | Defines liquid and gaseous fuels; tells their differences and areas of use. | 1c, 6a | 1 | A |
| **6** | Classifies the conversion technologies applied to coal and biomass; definitions; tells their differences/similarities; realize their benefits and future importance. | 1c, 6a, 7a, 9b, 11 | 1,11,15 | A,F,G |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | 1. Kural, O., (editör), “Kömür” , İTÜ Maden Fakültesi, 1998.  2. Probstein, R. F., Hicks, R. E., “Synthetic Fuels”, McGraw-Hill Book  Co., 1982.  3. Klass, D. L., “Biomass for Renewable Energy, Fuels, and Chemicals”,  Academic Press, 1998. |
| **Other References** | 1. Periodicals  2. Congress and symposium books.  3. Elliott, M. A.(editör), “Chemistry of Coal Utilization”, John Wiley &  Sons,1981. |
| **Tools and Equipment Required** | Computer, Projector |

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| **COURSE SYLLABUS** | |
| **1** | Energy, Types of Energy, Energy Use |
| **2** | Energy Resources; Classification of Fuels |
| **3** | Alternative Energy Sources |
| **4** | Coal: Formation, Composition, Properties, Analysis, Classification |
| **5** | Coal: Formation, Composition, Properties, Analysis, Classification |
| **6** | Coal Conversion Technologies: Pyrolysis, Liquefaction, Gasification |
| **7** | Coal Conversion Technologies: Pyrolysis, Liquefaction, Gasification |
| **8** | **MIDTERM** |
| **9** | Conversion Processes Applied to Biomass |
| **10** | Conversion Processes Applied to Biomass |
| **11** | Petroleum: Formation and Use; Natural Gas and Its Use |
| **12** | Problems Resulting from Fossil Fuel Use |
| **13** | Assignment presentations |
| **14** | Assignment presentations |
| **15** | Assignment presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 1,5 | 15 |
| Homework | 1 | 5 | 5 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) | 1 | 10 | 10 |
|  |  |  |  |
| Midterm | 1 | 1.5 | 1.5 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1.5 | 1.5 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **105** |
|  | **Total workload / 30** | | **3.5** |
|  | **Course ECTS Credits** | | **4** |
| **Assessment** | | | |
| **Semester activities** | **%** | | |
| Midterm | 30 | | |
| Quiz |  | | |
| Homework | 25 | | |
|  |  | | |
|  |  | | |
| **Semester final exam** | 45 | | |
| **Total** | 100 | | |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 3 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 4 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 4 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | 1. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| 1. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 4 |

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| **Instructor(s)** | | | | |
| **Instructor(s)** |  |  |  |  |
| **Signature** |  |  |  |  |

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Surface Chemistry | **151617641** |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 3 | - | - | - | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | Introducing surface tension and surface tension measurement methods, giving information about surface activity, adsorption balance, thermodynamics and isotherms, making applications related to adsorption from gas phase and solution, recognizing collidal systems and examining the applications of surface chemistry in industry. |
| **Course Description** | Liquid-gas interfaces, liquid-liquid interfaces, solid-gas interfaces, solid-liquid interfaces, colloidal systems. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | The student defines surface tension. | 1b | 1 | A |
| **2** | Explains surface tension measurement methods. | 1b | 1,3 | A |
| **3** | Identifies wetting, dirt removal and surfactants | 1b,1d | 1 | A |
| **4** | Create the adsorption isotherm and equation. | 1b,1d | 1,3 | A |
| **5** | Defines colloidal systems | 1b,1d | 1 | A |
| **6** | Explains industrial applications of surface chemistry. | 1b,1d,6b,11 | 1,12,15 | G |
| **7** | - | - | - | - |

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| **Textbook** | Shaw D. J., “Introduction to Colloid and Surface Chemistry”, Butterworths, 1992. |
| **Other References** | 1. Erbil, H. Y., “Solid and Liquid Interfaces”, Blackwell Publishing, 2006.  2. Sarıkaya, Y., “Fizikokimya”, Gazi Büro Kitapevi,1999. |
| **Tools and Equipment Required** | Computer, Projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Surface Chemistry and Determining Project Topics |
| **2** | Liquid-Gas Interfaces |
| **3** | Liquid-Liquid Interfaces |
| **4** | Liquid-Liquid Interfaces |
| **5** | Gas-Solid Interfaces |
| **6** | Gas-Solid Interfaces |
| **7** | Solid-Liquid Interfaces |
| **8** | **MIDTERM** |
| **9** | Solid-Liquid Interfaces |
| **10** | Solid-Liquid Interfaces |
| **11** | Colloidal Systems |
| **12** | Colloidal Systems |
| **13** | Project Presentations |
| **14** | Project Presentations |
| **15** | Project Presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 8 | 1 | 8 |
| 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) | 1 | 30 | 30 |
|  |  |  |  |
| Midterm | 1 | 1.5 | 1.5 |
| Midterm Exam preparation | 1 | 15 | 15 |
| Semester final exam | 1 | 1.5 | 1.5 |
| Final exam preparation | 1 | 15 | 15 |
|  | **Total workload** | | **113** |
|  | **Total workload / 30** | | **3.77** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Presentation | 20 |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 5 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 4 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | 1. To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| **5** | skill of using information technologies effectively |  |
| 1. To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| **6** | 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| 1. Skill of performing individual studies | 1 |
| **7** | 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| **8** | Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **9** | 1. Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| 1. a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| **10** | 1. b. Knowledge about legal regulations and standards of engineering |  |
| 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| **11** | Knowledge about sustainable development | 1 |

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| **Instructor(s)** | | | | |
| **Instructor(s)** | Prof. Dr. Ayşegül Aşkın |  |  |  |
| **Signature** |  |  |  |  |

28/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Industrial Electrochemistry | 151617642 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | To understand the fundamentals of electrochemistry and electrochemical reactions, to understand the principles related to the application areas of electrochemistry in industry and to know their functions, to perceive the applications of electrochemistry in industry. |
| **Course Description** | Basic concepts in electrochemistry, electrode potentials, measurement of electrode potentials, dependence of battery potential on concentration, batteries, dry batteries, rechargeable batteries, fuel cells, solar cells, corrosion, electrochemical reactors and their performances, industrial electrosynthesis processes, electrolytic processes, water purification and waste treatments. , chlor-alkali industries and metal plating |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | The student defines concepts related to electrochemistry. | 1c | 1,11 | A |
| **2** | Explains electrochemical cell components and transport events in these processes. | 1c | 1,11 | A |
| **3** | Explain the advantages and disadvantages of electrochemical processes. | 8 | 1,11,15 | A,D,F |
| **4** | Realizes the importance of electrochemical applications for a cleaner environment. | 8 | 1,11,15 | A,F,G |
| **5** | Recognizes the applications of electrochemistry in industry. | 4a | 1,11,15 | A,D,F,G |
| **6** | Compares electrochemical and chemical technologies. | 8 | 1,11 | A |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | Pletcher, D. and Walsh, F.C., “Industrial Electrochemistry”, Blackie Academic Professional, Paperback Edition, 1993. |
| **Other References** | 1. Yalçın, H. ve Gürü, M., “Elektrokimya ve Uygulamaları”, Palme Yayıncılık, 2010.  2. Bard A. J., Stratmann, M., Macdonald, D., Schmuki P., “Encyclopedia of Electrochemistry”, Vol. 5 Electrochemical Engineering, Wiley-VCH Verlag GmbH & Co., 2007.  3. Periodicals. |
| **Tools and Equipment Required** | Computer, Projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Electrochemical Technology and Basic Concepts; Electrochemical Reactions |
| **2** | Electrochemical Cell Components; Rate of Electrochemical Reactions |
| **3** | Mass and Heat Transfer in Electrochemical Cells; Advantages and Disadvantages of Electrochemical Processes |
| **4** | Electrochemical Reactor Models; Performance Indicators of Electrochemical Reactors |
| **5** | Electrolysis; Electrolysis Parameters |
| **6** | Chlor-Alkali Industry; Separation, Refining and Production of Metals by Electrochemical Way |
| **7** | Other Inorganic Electrolytic Processes; Organic Electrosynthesis |
| **8** | **MIDTERM** |
| **9** | Water purification |
| **10** | Electrochemical Processes Used for Waste Treatment and Recovery from Industrial Process Streams |
| **11** | Batteries and Fuel Cells |
| **12** | Corrosion and Control |
| **13** | Cost in Electrochemical Processes |
| **14** | Assignment Presentations and Evaluation |
| **15** | Assignment Presentations and Evaluation |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 10 | 10 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
| Midterm | 1 | 1.5 | 1.5 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1.5 | 1.5 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **114** |
|  | **Total workload / 30** | | **3.8** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz |  |
| Homework | 20 |
|  |  |
|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Katkı** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 2 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 3 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **Instructor(s)** | | | | |
| **Instructor(s)** |  |  |  |  |
| **Signature** |  |  |  |  |

26/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| **Course Name** | **Course Code** |
| Boron Technology | **151617643** |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 |  | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | None |
| **Course Objectives** | To provide information about the properties and usage areas of the boron element, its compounds and minerals, and to introduce boron technologies. |
| **Course Description** | Properties of the boron element, important boron minerals, boron reserves in the world and in Turkey, usage areas of important boron minerals and compounds, production of boron compounds, the effect of boron on the environment. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the physical and chemical properties of the element boron. | 1b | 1 | A |
| **2** | Identifies important boron minerals and compounds. | 1b | 1 | A |
| **3** | Analyzes the importance of Turkey in terms of boron reserves. | 10c | 1 | A |
| **4** | Interprets the usage areas of boron minerals and compounds. | 1c | 1 | A |
| **5** | Explains the production methods of important commercial boron compounds. | 1c | 1 | A |
| **6** | Establishes mass balance in processes involving chemical reactions related to the production of boron compounds. | 1d | 1, 6 | A |
| **7** | Prepares and presents the homework on boron technology as a group work. | 6b, 8, 11 | 12, 15 | D, G |

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| **Textbook** | Othmer, K., Encvclopedia of Chemical Technology, John Wiley, New York, 1978. |
| **Other References** | 1. DPT, Kimya Sanayii Hammaddeleri Çalışma Grubu Raporu, Rapor 2008. 2. Muetterties , E.L., The Chemistry of Boron and Its Compounds, John Wiley, New York, 1967. |
| **Tools and Equipment Required** | Computer, Projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Boron Technology |
| **2** | Properties of Boron Element |
| **3** | Important Boron Minerals |
| **4** | Boron Reserves in the World and Turkey |
| **5** | Important Boron Compounds |
| **6** | Main Usage Areas of Boron Minerals and Compounds |
| **7** | Boron Facilities in Turkey |
| **8** | **MIDTERM** |
| **9** | Production of Borax Pentahydrate, Borax Decahydrate and Anhydrous Borax |
| **10** | Boric Acid Production |
| **11** | Sodium Perborate Production |
| **12** | Sample Problems on Mass Balance |
| **13** | Presentation of Homework Reports |
| **14** | Presentation of Homework Reports |
| **15** | Presentation of Homework Reports |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 10 | 10 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) | 1 | 5 | 5 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **111** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Quiz |  |
| Homework | 15 |
| Presentation | 5 |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 2 |
| 1. Sufficient basic engineering and chemical engineering knowledge | 2 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development | 1 |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof.Dr. Mine Özdemir |  |  |  |
| **Signature** |  |  |  |  |

9/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Ion Exchange Technology | 151617644 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** |  |
| **Course Objectives** | Within the scope of this course, the basic principles of ion exchange technology, ion exchange resins and the synthesis of these resins, the physical and chemical properties of ion exchange resins, the application areas of the resins, and the definition of ion exchange methods. It also gives applications for the use of ion exchange technology in chromatographic separation processes, environmental applications and water treatment. |
| **Course Description** | Ion exchange theory, ion exchange materials, structure and properties, preparation of ion exchangers, ion exchange capacity, ion exchange methods, ion exchange balance, ion exchange kinetics, application areas of ion exchangers in industry, seminars and homework. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains ion exchange theory | 1c | 1 | A |
| **2** | Knows ion exchange substances and their properties. | 1c | 1 | A |
| **3** | Classifies ion exchange methods. | 1c | 1 | A |
| **4** | Explains ion exchange capacity, balance and kinetics. | 1c | 1 | A |
| **5** | Be aware of the application areas of ion exchangers in industry. | 1c,8 | 1 | A, D |
| **6** | Works as a team while preparing assignments, prepares and presents reports. | 6b, 9a | 1,12 | D |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | Helfferich,F., Ion Exchange, McGraw-Hill, (1962). |
| **Other References** | 1.Eckenfelder, W. W., Industrial Water Pollution Control, McGraw-Hill, (1989).2.B.A.Bolto, L.Pawlowski, E.&F.N.Spon, "Wastewater Treatment by Ion Exchange", New York, (1987).3.Bektaş, T.E., “İyon Değişimi Yöntemi ile Sulu Çözeltiden Bor Giderimi Üzerine Etki Eden Parametrelerin İncelenmesi”, Doktora tezi, Eskişehir Osmangazi Üniversitesi, 2005. |
| **Tools and Equipment Required** | Computer, Projector |

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| **COURSE SYLLABUS** | |
| **1** | Ion exchange theory |
| **2** | Ion exchange substances, their structure and properties |
| **3** | Synthesis of ion exchange resins |
| **4** | Ion exchange methods |
| **5** | Ion exchange methods |
| **6** | Ion exchange capacity, ion exchange balance |
| **7** | Ion exchange capacity, ion exchange balance |
| **8** | **MIDTERM** |
| **9** | Ion exchange kinetics |
| **10** | Ion exchange kinetics |
| **11** | Application areas of ion exchangers in industry |
| **12** | Application areas of ion exchangers in industry |
| **13** | Homework Presentations |
| **14** | Homework Presentations |
| **15** | Homework Presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 10 | 10 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
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| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **104** |
|  | **Total workload / 30** | | **3.46** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Homework | 20 |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | 1. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| 1. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **Instructor(s)** | | | | |
| **Instructor(s)** |  |  |  |  |
| **Signature** |  |  |  |  |

11/7/2022

** ESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Composite and Biomaterials | **151617645** |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Gaining thorough knowledge about the general properties of composites and biomaterials, important composites and biomaterials and the developments of those materials. |
| **Course Description** | Introduction to composite materials, examination the advantages of composite materials and applications, the description of biomaterials and classifications, metalic-ceramic-polymer and composite biomaterials and the problems of these materials according to the application areas and the interaction of biomaterials with the surroundings. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines composite materials and their components. | 1c | 1 | A |
| **2** | Tells the differences/similarities between other materials. | 8 | 1, 8 | A |
| **3** | Indicates the application areas of composite materials. | 1c, 8 | 1, 8 | A |
| **4** | Explains biomaterials and their historical development. | 1c, 8 | 1, 8 | A |
| **5** | Classifies biomaterials. | 1c | 1 | A |
| **6** | Discusses the problems of biomaterials according to their application areas. | 7a, 11 | 1, 8 | A |
| **7** | Draws conclusions from the prepared assignment regarding material technologies and composite/biomaterial fields. | 6a, 7a, 7b, 8, 10b | 15 | D, G |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | 1. Şahin, Y., “Kompozit Malzemelere Giriş”, Gazi Kitabevi, 2000.  2. Wong J.Y. and Bronzino J.D., “Biomaterials”, CRC Press, 2007. |
| **Other References** | 1. Kelly, A. and Zweben, C., “Comprehensive Composite Materials”, Amsterdam: Elsevier, 2000.   1. Matthews F.L. and Rawlings R.D., “Composite Materials: Engineering and Science”, CRC Press, 1999 2. Mohanty A.K., Misra M. and Drzal L.T., “Natural Fibers, Biopolymers and Biocomposites”, CRC Press, 2005 3. Guelcher, S.A. and Hollinger, J.O., “An Introduction to Biomaterials”, Boca Raton, Flu: CRC/Taylor&Francis, 2006.   Süreli yayınlar |
| **Tools and Equipment Required** | Projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Composite Materials |
| **2** | Reinforcement Elements and Properties in Composite Materials |
| **3** | Matrix Materials in Composite Materials |
| **4** | Examining the Advantages of Composite Materials |
| **5** | Application Areas |
| **6** | Definition and Classification of Biomaterial |
| **7** | Metallic, Ceramic Biomaterials |
| **8** | **MIDTERM** |
| **9** | Ceramic Biomaterials |
| **10** | Polymer and Composite Biomaterials |
| **11** | Composite Biomaterials |
| **12** | Application Areas |
| **13** | Problems of Biomaterials According to Their Application Areas and Their Interaction with the Environment |
| **14** | Homework Presentations |
| **15** | Homework Presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 15 | 15 |
| 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 | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **111** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz | - |
| Homework | 25 |
|  |  |
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| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 3 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 1 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation | 1 |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **Instructor(s)** | | | | |
| **Instructor(s)** |  |  |  |  |
| **Signature** |  |  |  |  |

26/7/2022

** amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Technical Polymers | 151617646 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | Within the scope of this course, students are provided with information about the definition, mechanism, production processes, processing methods, additives of polymers and different types of industrial applications of technical polymers. |
| **Course Description** | Raw materials and polymer additives used within the scope of the technical polymer course, fiber technology, production techniques of technical polymers such as polymer foams, polymer films and polymer coatings; polymeric composite materials; industrial applications |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | The student realizes the importance of polymers. | 6a | 1,2 | A |
| **2** | Classifies polymers. | 6a | 1,2 | A |
| **3** | Defines polymerization processes. | 1c, 6a | 1,2 | A |
| **4** | Defines and calculates polymer molecular weights. | 6a | 1,2 | A |
| **5** | Examines synthesis methods of polymers | 6a | 1,2 | A |
| **6** | Learn about additives and fillers | 11 | 1,2 | A |
| **7** | Associates information about polymers and polymerization with the polymer materials seen around them. | 11 | 1,2 | A |
| **8** | Makes a presentation on the subject | 7a,7b | 11,15 | C,G |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | Pişkin, E., Polimer Teknolojisine Giriş, Anka Ofset AŞ., İstanbul, 1987. |
| **Other References** | Mehmet Saçak, Polimer Kimyası, Ankara, Gazievi,2010  Tim A. Osswald and Georg Menges, Material Science of Polymers for Engineers,3rd Edition, Hanser Publishers, Munich,1995 |
| **Tools and Equipment Required** | Projector |

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| **COURSE SYLLABUS** | |
| **1** | General Information About Technical Polymers and Raw Materials |
| **2** | Physical, Chemical and Mechanical Properties of Technical Polymers |
| **3** | Polymerization techniques and Polymer Additives |
| **4** | Thermoplastic, Thermoset and Elastomer Technology |
| **5** | Polymer composites |
| **6** | Fiber Technology |
| **7** | Polymer Foams |
| **8** | **MIDTERM** |
| **9** | Polymer Films |
| **10** | Polymer Films |
| **11** | Polymer Coatings |
| **12** | Polymer Coatings |
| **13** | Student Presentations |
| **14** | Student Presentations |
| **15** | Student Presentations |
| **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) | 11 | 3 | 33 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 1 | 14 |
| 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) | 1 | 20 | 20 |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 20 | 20 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 20 | 20 |
|  | **Total workload** | | **109** |
|  | **Total workload / 30** | | **3.6** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 30 |
| Presentation | 30 |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences | 1 |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 4 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge | 1 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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| **Instructor(s)** | |
| **Instructor(s)** |  |
| **Signature** |  |

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Extraction Technology | 151617647 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 3 | - | - | - |

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

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| --- | --- |
| **Prerequieite(s)** | - |
| **Course Objectives** | To teach students the basic principles of the extraction process and to provide them with detailed information about the extraction devices and processes they may encounter in the industry. |
| **Course Description** | Introduction to extraction processes; basic principles of solid-liquid and liquid-liquid extraction; industrial applications; choice of solvent in extraction; classification, introduction and selection of extraction devices; Equilibrium relations and mass balances in extraction; Innovations related to extraction processes (Supercritical fluid extraction, extraction distillation, etc.). |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Defines the basic principles of the extraction process. | 1c | 1 | A |
| **2** | Explains industrial applications of the extraction process. | 1c | 1 | A |
| **3** | Compares and selects solvents that can be used in the extraction process. | 1c | 1 | A |
| **4** | Defines the processes required for the preparation of solids in the solid-liquid extraction process and explains the importance of this process. | 1c | 1 | A |
| **5** | Classifies, compares and selects devices and processes that can be used in the extraction process. | 4a | 1 | A |
| **6** | Explains phase equilibrium relationships, formulates and calculates mass balances. | 1c, 1a | 1, 6 | A |
| **7** | Recognizes and examines current developments regarding extraction. | 8 | 1 | A |
| **8** | Performs teamwork, prepares and presents reports while preparing group homework. | 6b, 7a, 8 | 12, 15 | E,G |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | McCabe, W. L., Smith, J. C., Harriot, P., Unit Operations of Chemical Engineering, 7th edition, McGraw-Hill Book Co., 2005. |
| **Other References** | 1.Benitez, J. L., Principles and Modern Applications of Mass Transfer Operations, Wiley-Interscience, 2002.  2. Geankoplis, C. J., Transport Processes and Unit Operations, 3rd edition, Prentice Hall, 1993. |
| **Tools and Equipment Required** | Computer, Projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, Explaining the Purpose and Content of the Course |
| **2** | Importance of Extraction in Industry, Introduction to Liquid-Liquid Extraction |
| **3** | Liquid-Liquid Extraction Applications and Solvent selection |
| **4** | Liquid-Liquid Extraction Devices and Device Selection |
| **5** | Equilibrium Relationships in Liquid-Liquid Extraction, Phase Diagrams and Partition Coefficient |
| **6** | Staged Contact Systems and Mass Balances in Liquid-Liquid Extraction |
| **7** | Supercritical Fluid Extraction and Extraction Distillation |
| **8** | **MIDTERM** |
| **9** | Introduction to Solid-Liquid Extraction, Solid Preparation and Solvent Selection |
| **10** | Solid-Liquid Extraction Devices and Device Selection |
| **11** | Equilibrium Relationships in Solid-Liquid Extraction |
| **12** | Staged Contact Systems and Mass Balances in Solid-Liquid Extraction |
| **13** | Staged Contact Systems and Mass Balances in Solid-Liquid Extraction |
| **14** | Assignment Presentation |
| **15** | Assignment Presentation |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | 1 | 14 | 14 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) | 1 | 4 | 4 |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 14 | 14 |
|  | **Total workload** | | **120** |
|  | **Total workload / 30** | | **4** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Quiz | - |
| Homework | 20 |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics | 1 |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 4 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: | 1 |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 1 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **Instructor(s)** | | | | |
| **Instructor(s)** |  |  |  |  |
| **Signature** |  |  |  |  |

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Experimental Design in Chemical Engineering | 151617655 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | 0 | 3 | 4 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Introducing experimental design methods, determining optimum experimental design parameters and providing information about realizing a robust design. |
| **Course Description** | Experiments in engineering, experimental design methods, Taguchi experimental design method, determination of factors and noise affecting the experiment, orthogonal arrangement, determination of optimum factor levels and variance analysis. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Student defines experimental design | 1c | 1, 15 | A, D, G |
| **2** | Establishes the Taguchi experimental design | 1d, 3, 5a | 1, 15 | D, G |
| **3** | Determines factor levels and creates orthogonal alignment | 1d, 2 | 1, 11, 15 | A, D, G |
| **4** | Ranks the importance of the factors affecting the result and  determines optimum values | 5b | 1, 15 | A, D, G |
| **5** | Optimizes by applying experimental design | 5a, 5b | 1, 11, 15 | D, G |
| **6** |  |  |  |  |
| **7** |  |  |  |  |

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| **Textbook** | 1. Genichi Taguchi, 1991. System of Experimental Design: Engineering Methods to  Optimize Quality and Minimize Costs, Quality Resources, 531 p. |
| **Other References** | 1. Daniel Michael Grove, Timothy Peter Davis, 1992. Engineering, Quality, and  Experimental Design, Longman Scientific&Technical, 361 p. 2. Douglas C. Montgomery,  2009. Design and Analysis of Experiments, 7th Ed., John Wiley&Sons, 3. Thomas P.  Ryan, 2006. Modern Experimental Design, John Wiley&Sons. |
| **Tools and Equipment Required** | Computer, Projector |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Experimental Design |
| **2** | Basic Experimental Design Methods |
| **3** | Taguchi Experimental Design |
| **4** | Multifactorial Design with Taguchi Experimental Design |
| **5** | Determining Factor Levels and Creating Orthogonal Arrays |
| **6** | Signal:Noise |
| **7** | Response Data Analysis |
| **8** | **MIDTERM** |
| **9** | Analysis of Model Parameters |
| **10** | Variance Analysis |
| **11** | Determining Optimum Factor Levels |
| **12** | Response Data Analysis and Evaluation of Variance Analysis |
| **13** | Performing Optimization |
| **14** | Homework Presentations |
| **15** | Homework Presentations |
| **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 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 10 | 10 |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) | 1 | 5 | 5 |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **111** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credits** | | **4** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 35 |
| Quiz |  |
| Homework | 20 |
|  |  |
| **Semester final exam** | 45 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 2 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 3 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 2 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. | 2 |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: | 3 |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 3 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **Instructor(s)** | | | | |
| **Instructor(s)** | Doç.Dr.Uğur Moralı |  |  |  |
| **Signature** |  |  |  |  |

9/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Introduction to Nanotechnology | 151617660 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 7 | 3 | - | 3 | 4 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 2 | 1 |  |  |  |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | The aim of this course is to give information about the definition of nanotechnology, the concept of nanosize, basic information about nanoparticles, the development process of nanoscience and nanotechnology, the application areas of nanotechnology, the effects of nanotechnology on the environment and human health, the production of environmentally friendly nanomaterials and current developments in nanomaterials. |
| **Course Description** | This course aims to raise awareness of the fundamentals of nanoscience and nanotechnology, and its current and future potential applications. What is nanotechnology? Macro, micro, nano structures; Methods used in the study of nanostructures. Applications of Nanotechnologies, Dyes, Textiles (medical, technical, ecological, home and smart textiles), Health applications, Possible future applications and provides information on the latest developments in nanoscale materials. |

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| **Course Outcomes** | | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | To understand the importance and basics of nanotechnology and the materials used in this technology | | 1c,8 | 1 | A |
| **2** | To have knowledge about the latest applications of nanotechnology | | 1c,8 | 1 | A,D |
| **3** | Having general knowledge about choosing suitable processes, materials and technology for industrial applications | | 1c | 1 | A,D |
| **4** | Evaluating environmental applications of nanomaterials and advanced materials | | 1c | 1 | A,D |
| **5** |  | |  |  |  |
| **6** |  | |  |  |  |
| **7** |  | |  |  |  |
| **8** |  | |  |  |  |
| **9** |  | |  |  |  |
| **10** | . | |  |  |  |
| **Textbook** | | Poole, C.P., Owens, F.J..”Introduction to Nanotechnology” Wiley Interscience, 2003. | | | |
| **Other References** | | 1. Ventra M.Di., S. Evoy, J.R.H. Jr., Introduction to Nanoscale Science and Technology, Springer Science Business Media, Inc., 2004.2. Wilson, M., Kannangara, K., Smith, G., Simmons, M., Raguse, B.,”Nanotechnology” Chapman & Hall, 2002. 3. Siegel R.W., Hu E., and Roco M.C., Nanostructure Science and Technology: R&D Status and Trends in Nanoparticles, Nanostructured Materials and Nanodevices, Kluwer Academic Publishers, Dordecht, 2000. | | | |
| **Tools and Equipment Required** | | Computer | | | |

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| **COURSE SYLLABUS** | |
| **1** | Introduction to Nanotechnology |
| **2** | Definition and history of nanotechnology |
| **3** | Examples of nanotechnology from nature |
| **4** | Principles of formation of nanostructures |
| **5** | Nanomaterials |
| **6** | Properties of Nanomaterials |
| **7** | Structural and thermal characterization of nanostructures |
| **8** | **MIDTERM** |
| **9** | Silica Nanostructures |
| **10** | Carbon nanotubes |
| **11** | Applications of nanostructures in energy storage and renewable energy systems |
| **12** | Other applications of nanotechnology |
| **13** | Homework presentations |
| **14** | Homework presentations |
| **15** | Homework presentations |
| **16,17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 2 | 20 |
| Homework | 1 | 15 | 15 |
| 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 | 1 | 14 | 14 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 16 | 16 |
|  | **Total workload** | | **111** |
|  | **Total workload / 30** | | **3.7** |
|  | **Course ECTS Credits** | | **4** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Exam | 35 |
| Project | 20 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 45 |
| **Total** | **100** |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 5 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 3 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Assoc. Prof. Ceyda BİLGİÇ |  |  |  |
| **Signature** |  |  |  |  |

5/11/2021

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Chemical Technologies | 151618422 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 | 0 | 3 | 4 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** |  |
| **Course Objectives** | For each of the processes of inorganic and organic technologies, introducing the properties of raw materials, mass and energy balances, flow sheets of the processes, tables of control functions and other related subjects, evaluating the outputs and results together with economic data. Additionally,  provide the students with knowledge on different sectors of chemical industry by organizing factory visits. |
| **Course Description** | Chemical technology; industrial gases; water technology; sulfuric acid; ammonia; nitric acid; phosphoric acid; chlorine, sodium hydroxide and hydrochloric acid; soda; sodium chloride; mineral fertilizers; lime and plaster; ceramic industry; glass industry; cement industry; sugar industry; fats and oils, soaps and detergents; paper industry, petroleum technology. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of water quality in industry, water purification and treatment processes. | 1c, 4a, 11 | 1 | A |
| **2** | Discusses energy recovery methods and their importance. | 1c, 4a, 11 | 1 | A |
| **3** | Explains the production methods and usage areas of industrial gases. | 1c, 4a, 11 | 1 | A |
| **4** | Explains the stages, physical and chemical changes, and effective parameters related to the inorganic technologies given in the course. | 4a, 11 | 1 | A |
| **5** | Explains the stages, physical and chemical changes related to organic technologies given in the course. | 4a, 11 | 1 | A |
| **6** | Thanks to factory tours, he/she associates his theoretical knowledge with practice. | 2, 4a, 11 | 9, 15 | E |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1. Biçer, A., Yalçın, H., İnorganik Kimyasal Teknoloji, G.Ü.V. İlke Yayınevi, Ankara, 2007. 2. Olcay, A., Kimyasal Teknolojiler, Gazi Büro Kitabevi Tic. Ltd. Şti., Ankara, 1998. |
| **Other References** | 1. Çataltaş, İ. A., Kimyasal Proses Endüstrileri I-II”, İnkilap Kitabevi Yayın San. ve Tic. A. Ş., İstanbul, 1985. 2. Shreve, R. N. and Brink, J. A., Shreve's Chemical Process Industries, 5th edition, McGraw-Hill, New York, 1984. |
| **Tools and Equipment Required** | Computer, projector. |

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| **COURSE SYLLABUS** | |
| **1** | Introduction, Course Introduction, Information on Course Evaluation, Chemical Technology |
| **2** | Chemical Technology (Industrial Raw Materials, Preparation Processes, Energy Consumption, Industrial Wastes) |
| **3** | Industrial Gases |
| **4** | Water Technology |
| **5** | Sulfuric Acid, Ammonia, Nitric Acid |
| **6** | Phosphoric Acid, Chlorine, Sodium Hydroxide, Hydrochloric Acid |
| **7** | Soda, Sodium Chloride, Mineral Fertilizers |
| **8** | **MIDTERM** |
| **9** | Lime and Plaster, Ceramics, Glass, Cement |
| **10** | Lime and Plaster, Ceramics, Glass, Cement |
| **11** | Technical tour |
| **12** | Sugar, Chemical Processing of Wood and Paper Production |
| **13** | Oils and Fats, Soap, Detergent |
| **14** | Petroleum Technology |
| **15,16** | **FINAL EXAM** |

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| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 3 | 42 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 3 | 30 |
| Homework | 2 | 3 | 6 |
| 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 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 18 | 18 |
|  | **Total workload** | | **108** |
|  | **Total workload / 30** | | **3.6** |
|  | **Course ECTS Credits** | | **4** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm | 40 |
| Quiz |  |
| Technical tour | 20 |
|  |  |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge | 4 |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. | 1 |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 5 |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies |  |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 5 |

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| **INSTRUCTOR(S)** | | |
| **Instructor(s)** | Prof. Dr. Alime Çıtak | Doç. Dr. Belgin Karabacakoğlu |
| **Signature** |  |  |

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Chemical Engineering Laboratory III | 151618424 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 |  | 4 | 2 | 5 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Chemical Reaction Engineering |
| **Course Objectives** | To teach students how to carry out experiments which application of previous courses, to teach how to generate reports, to provide experience for students to work in team environment, to teach students how to analyze and interpret experimental data using previous courses materials |
| **Course Description** | Packed and fluidized bed fluidization and heat transfer in fluidized bed, plug flow reaction reactor, liquid-phase chemical reaction reactor, system of level control, system of temperature control; system of flow control., air flow, liquid flow |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Specifies the purpose of the experiment, experimental parameters and test method | 1d, 4a, 5b | 2, 5 | B, C, E |
| **2** | Collects data by conducting experiments and analyzes the data. | 5b, 6b | 2, 3, 12 | E, I |
| **3** | Presents experimental results using appropriate graphs, tables and figures. | 4b, 5b, 6b, 7a | 12, 15 | E |
| **4** | Discusses the experimental results | 5b, 7a | 3, 5, 7, 15 | C, E |
| **5** | Reports experimental work in accordance with the rules. | 6b,7a | 12, 15 | E |
| **6** | Takes an active role within the team in the execution and reporting of the experiment. | 5b, 6b | 3, 12, 15 | E, I |
| **7** | Relates engineering facts, events and situations with his experiments. | 1d, 5b | 2, 5 | B, C, E |
| **8** | Recognizes the importance of professional and ethical responsibility. | 9a | 1 | E |
| **9** | Knows laboratory safety and can apply its rules. | 11 | 1 | I |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Kimya Mühendisliği Laboratuvarı I-II-III Deney Kılavuzu (Ed: M. E. Yıldırım) ESOGÜ Yayınları, No:167, 2009 |
| **Other References** | 1. Stephanopoulos, G., “Chemical Process Control”, Prentice-Hall, Englewood Cliffs, ew Jersey, 1983.  2. McCabe, W. L., Smith, J. C., Harriott, P., “Unit Operations of Chemical Engineering”, 7th edition, McGraw-Hill, New York, 2005.  3. Levenspiel, O., “Chemical Reaction Engineering”, Wiley Int, New York, 1972. Perry, R. H., “Perry's Chemical Engineering Handbook”, 6th edition, McGraw-Hill, New York, 1984. |
| **Tools and Equipment Required** |  |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Creating group lists |
| **2** | Laboratory safety training and course introduction |
| **3** | Fixed and fluidized bed |
| **4** | Fluidization and heat transfer in fluidized bed |
| **5** | Piston flow reactor |
| **6** | Liquid phase chemical reaction vessel |
| **7** | Level control system |
| **8** | **MIDTERM** |
| **9** | temperature control system |
| **10** | flow control system |
| **11** | Air flow mechanism |
| **12** | Liquid flow assembly |
| **13** | Make-up Experiments |
| **14** | Make-up Experiments |
| **15,16** | **FINAL EXAM** |

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| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 8 | 4 | 32 |
| Class Study time (revision, reinforcement, pre-study,….) |  |  |  |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation | 7 | 2 | 14 |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 7 | 15 | 105 |
| Project (including preparation and presentation time) |  |  |  |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | | **151** |
|  | **Total workload / 30** | | **5.03** |
|  | **Course ECTS Credits** | | **5** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Quiz | 30 |
| Oral Exam | 30 |
| Report | 40 |
|  |  |
|  |  |
| **Semester final exam** |  |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 2 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices | 1 |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 4 |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 1 |

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

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Design in Chemical Engineering II | 151618567 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 3 | 2 | 4 | 7 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  |  | 4 |  |  |

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

|  |  |
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| **Prerequieite(s)** | Design in Chemical Engineering I (It is also recommended that students have taken and succeed Chemical Process Calculations, Separation Processes, Fluids Mechanics, Heat Transfer, Mass Transfer, Reactor Design courses. |
| **Course Objectives** | Using knowledge and skill gained other courses, to get main design experience cover engineering standards, real conditions, constraints and software; To stimulate disciplinary and interdisciplinary teamwork and get this skill to the students. To teach cost estimation methods. |
| **Course Description** | Design of a selected chemical process: Mass balance and energy balance of process, selection and design of process equipment, safety and environmental impacts/constraints and ethical constraints, cost analysis and optimization. The use of appropriate software (such as CHEM-CAD) for design. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Establishes mass and energy balance. | 3 | 1, 6, 12, 14 | A, J |
| **2** | Designs the necessary devices for the process to be designed, prepares their specifications and selects the appropriate device. | 3 | 1, 6, 12, 14 | A, J |
| **3** | Recognizes the importance of facility location selection and working safety. | 3, 9a, 11 | 1, 12, 14 | J |
| **4** | Questions environmental impacts and ethical values in process design. | 3, 9a, 11 | 1, 12, 14 | J |
| **5** | Conducts cost analysis in process design and selects the most appropriate one. | 3 | 1, 6, 12, 14 | J |
| **6** | Uses appropriate software in process design. | 3 | 1, 6, 12, 14 | J |
| **7** | Works as a team while preparing the main design project, prepares and presents reports. | 3, 6b,7c,7d, 8, 9a, 10c, 11 | 12, 14, 15 | J |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Peters, M. S., Timmerhaus, K. D., Plant Design and Economics for Chemical Engineers, McGraw Hill, New York, 2003. |
| **Other References** | 1. Sinnot, R., Towler, G., Chemical Engineering Design, Fifth Edition, Elsevier, USA, 2009. 2. Books and relevant standards and legal regulations on facility design and engineering economics, momentum, mass and heat transfer, stoichiometry, thermodynamics, separation processes, chemical reaction engineering. |
| **Tools and Equipment Required** | Computer, Projector |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Explaining the Purpose and Content of the Course |
| **2** | Flow Charts, Establishing Mass Balance |
| **3** | Establishing Mass Balance |
| **4** | Establishing Energy Balance |
| **5** | Establishing Energy Balance |
| **6** | Design of Process Devices |
| **7** | Midterm Project Presentations |
| **8** | **MIDTERM** |
| **9** | Design of Process Devices |
| **10** | Design of Process Devices, ChemCAD Application |
| **11** | Facility Site and Device Placement |
| **12** | Cost Analysis and Optimization |
| **13** | Working Safety and Reducing and Preventing Losses |
| **14** | Environmental Impacts/Constraints and Ethical Constraints |
| **15** | Project Presentations |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 15 | 5 | 75 |
| Class Study time (revision, reinforcement, pre-study,….) | 10 | 5 | 50 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) |  |  |  |
| Project (including preparation and presentation time) | 1 | 50 | 50 |
| Presentation (including preparation time) |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 15 | 15 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 17 | 17 |
|  | **Total workload** | | **211** |
|  | **Total workload / 30** | | **7** |
|  | **Course ECTS Credits** | | **7** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Exam | 20 |
| Project Follow up | 20 |
| Project | 30 |
|  |  |
|  |  |
| **Semester final exam** | 30 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. | 5 |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 1 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 4 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development | 1 |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 4 |

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

6/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Project and Risk Management | 151618568 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 2 | 0 | 2 | 3 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | - | - | 2 | - |

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

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| **Prerequieite(s)** | - |
| **Course Objectives** | Proje yönetimi ve risk yönetimi kavram ve tekniklerini açıklamak, bir projenin nasıl ve hangi araçlarla izlenmesi gerektiğini öğretmek, değişiklik yönetimi felsefesini anlamak. |
| **Course Description** | Proje ve proje yönetiminin tanımı, proje el kitabının hazırlanması, Gannt diyagramı, CPM ve PERT teknikleriyle proje yönetimi, projede kaynakların çizelgelenmesi, MS Project 2007 ile proje planlama ve izleme, risk analiz ve değerlendirme yöntemleri, karar ağacı ve risk altında karar verme teknikleri ile risk analizi, değişiklik yönetimi ve yeniden yapılanma felsefesi. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Matematik bilgisini proje planlamada kullanır. | 10a | 1, 6 | A, J |
| **2** | Güncel bilgi teknolojilerini kullanır. | 4b, 10a | 1, 6 | A, J |
| **3** | Proje yönetimini açıklar. | 10a | 1, 6 | A |
| **4** | Risk yönetimini açıklar. | 10a | 1, 6 | A |
| **5** | Değişiklik yönetiminin önemini fark eder. | 10a | 1, 6 | A |
| **6** | Proje hazırlar | 4b, 10a, 6b | 6, 12, 14 | J |
| **7** | - | - | - | - |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| --- | --- |
| **Textbook** | Project Management 3rd ed., Rory Burke, 1999, Wiley, 343 p. |
| **Other References** | Project Management, C.F. Gray, E.W. Larson, 2000, Mc Graw Hill, 496 p. |
| **Tools and Equipment Required** | MS Project 2007 yazılımı |

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| **COURSE SYLLABUS** | |
| **1** | Proje ve proje yönetimi kavramları, proje el kitabının hazırlanması |
| **2** | Gantt şeması ile proje çizelgeleme |
| **3** | CPM ile proje planlama |
| **4** | CMP ile proje planlama örneklerinin çözümü |
| **5** | PERT ile proje planlama |
| **6** | PERT ile proje planlama örneklerinin çözümü |
| **7** | Proje kaynaklarının çizelgelenmesi |
| **8** | **MIDTERM** |
| **9** | MS Project ile proje planlama ve izleme |
| **10** | Risk analizindeki temel kavramlar |
| **11** | Risk analizi ve değerlendirme yöntemleri |
| **12** | Karar ağacı ve Bayes ile risk analizi |
| **13** | Risk altında karar verme teknikleri |
| **14** | Değişiklik yönetimi felsefesi ve temel kavramları |
| **15** | Süreç analizi ve yeniden yapılanma |
| **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 | 2 | 28 |
| Class Study time (revision, reinforcement, pre-study,….) | 7 | 1 | 7 |
| Homework | - | - | - |
| Quiz | - | - | - |
| Quiz preparation | - | - | - |
| Oral Exam | - | - | - |
| Oral Exam prep | - | - | - |
| Report (including preparation and presentation time) | - | - | - |
| Project (including preparation and presentation time) | 1 | 20 | 20 |
| Presentation (including preparation time) | - | - | - |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 2 | 2 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 2 | 2 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **79** |
|  | **Total workload / 30** | | **2.63** |
|  | **Course ECTS Credits** | | **3** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midtern | 30 |
| Homework | 30 |
|  |  |
|  |  |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 3 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies |  |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 1 |
| **7** | 1. Skill of effective oral and writing communication in Turkish |  |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management | 5 |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

17/11/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Internship I | 151618572 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 3-8 |  | 1 |  | 1 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| 1 |  |  |  |  |

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

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| --- | --- |
| **Prerequieite(s)** | Beginning the 2nd year (To have taken the laboratories in these periods) |
| **Course Objectives** | It is to consolidate the student's theoretical knowledge with a well-planned and supervised work experience applied in the relevant industry, business or government environments. |
| **Course Description** | Giving the opportunity to have practical experience about the application of theoretical knowledge in the field of Chemical Engineering. Internship I course covers 15 working days under the supervision of a consultant/expert in a factory, intermediary institution and/or Laboratory/R & D departments of the enterprise. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Students should graduate with professional experience and skills as well as the theoretical knowledge they have acquired. | 5b,6a, 6b, 7a,7c,7d | 6,15 | E,G |
| **2** |  |  |  |  |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
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| **Textbook** | Related web pages, documents, reports of the internship company. |
| **Other References** | Books, specifications, regulations, standards, guides, websites about the internship field. |
| **Tools and Equipment Required** | Tools and equipment available in the internship company. |

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| **COURSE SYLLABUS** | |
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| **5** |  |
| **6** |  |
| **7** |  |
| **8** | **MIDTERM** |
| **9** |  |
| **10** |  |
| **11** |  |
| **12** |  |
| **13** |  |
| **14** |  |
| **15** |  |
| **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) |  |  |  |
| Class Study time (revision, reinforcement, pre-study,….) |  |  |  |
| 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) |  |  |  |
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| Midterm |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | |  |
|  | **Total workload / 30** | |  |
|  | **Course ECTS Credits** | | **1** |

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| **Assessment** | |
| **Semester activities** | **%** |
|  |  |
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|  |  |
| **Semester final exam** |  |
| **Total** |  |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 5 |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 5 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 5 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
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| **Course Name** | **Course Code** |
| Internship II | 151618573 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 4-8 |  | 2 |  | 2 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  |  |  |

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

|  |  |
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| **Prerequieite(s)** | Having completed the 2nd grade |
| **Course Objectives** | It is to consolidate the student's theoretical and applied knowledge with a well-planned and supervised work experience applied in relevant industry, business or government environments and be able to use it in solving real-life problems. |
| **Course Description** | Giving the opportunity to have practical experience about the application of theoretical knowledge in the field of Chemical Engineering. Internship I course covers 15 working days under the supervision of a consultant/expert in a factory, intermediary institution and/or Laboratory/R & D departments of the enterprise. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Students should graduate with professional experience and skills as well as the theoretical knowledge they have acquired. | 6a, 6b, 7b,7c,7d,8,9a,9b,10a, 10c,11 | 6,15 | E,G |
| **2** | To be able to share their knowledge, skills and competencies by being aware of their responsibilities individually or within the team during the practical internship process. | 6a, 6b, 7a,7c,7d | 6,15 | E,G |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
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| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Related web pages, documents, reports of the internship company. |
| **Other References** | Books, specifications, regulations, standards, guides, websites about the internship field. |
| **Tools and Equipment Required** | Tools and equipment available in the internship company. |

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| **COURSE SYLLABUS** | |
| **1** |  |
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| **6** |  |
| **7** |  |
| **8** | **MIDTERM** |
| **9** |  |
| **10** |  |
| **11** |  |
| **12** |  |
| **13** |  |
| **14** |  |
| **15** |  |
| **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) |  |  |  |
| Class Study time (revision, reinforcement, pre-study,….) |  |  |  |
| 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 |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | |  |
|  | **Total workload / 30** | |  |
|  | **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
|  |  |
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|  |  |
|  |  |
| **Semester final exam** |  |
| **Total** |  |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 5 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 5 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 3 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 3 |
| b. Knowledge about legal regulations and standards of engineering | 3 |
| **10** | 1. Knowledge about project management, risk management and change management | 3 |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 3 |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Internship III | 151618574 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 4-8 |  | 2 |  | 2 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Having completed the 2nd grade |
| **Course Objectives** | It is to consolidate the student's theoretical and applied knowledge with a well-planned and supervised work experience applied in relevant industry, business or government environments and be able to use it in solving real-life problems. |
| **Course Description** | Giving the opportunity to have practical experience about the application of theoretical knowledge in the field of Chemical Engineering. Internship I course covers 15 working days under the supervision of a consultant/expert in a factory, intermediary institution and/or Laboratory/R & D departments of the enterprise. |

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| --- | --- | --- | --- | --- |
| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Students should graduate with professional experience and skills as well as the theoretical knowledge they have acquired. | 6a, 6b, 7b,7c,7d,8,9a,9b,10a, 10c,11 | 6,15 | E,G |
| **2** | To be able to share their knowledge, skills and competencies by being aware of their responsibilities individually or within the team during the practical internship process. | 6a, 6b, 7a,7c,7d | 6,15 | E,G |
| **3** |  |  |  |  |
| **4** |  |  |  |  |
| **5** |  |  |  |  |
| **6** |  |  |  |  |
| **7** |  |  |  |  |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- | --- |
| **Textbook** | Related web pages, documents, reports of the internship company. |  |
| **Other References** | Books, specifications, regulations, standards, guides, websites about the internship field. |  |
| **Tools and Equipment Required** | Tools and equipment available in the internship company. |  |

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| **COURSE SYLLABUS** | |
| **1** |  |
| **2** |  |
| **3** |  |
| **4** |  |
| **5** |  |
| **6** |  |
| **7** |  |
| **8** | **MIDTERM** |
| **9** |  |
| **10** |  |
| **11** |  |
| **12** |  |
| **13** |  |
| **14** |  |
| **15** |  |
| **16,17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) |  |  |  |
| Class Study time (revision, reinforcement, pre-study,….) |  |  |  |
| 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 |  |  |  |
| Midterm Exam preparation |  |  |  |
| Semester final exam |  |  |  |
| Final exam preparation |  |  |  |
|  | **Total workload** | |  |
|  | **Total workload / 30** | |  |
|  | **Course ECTS Credits** | | **2** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
|  |  |
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|  |  |
|  |  |
|  |  |
| **Semester final exam** |  |
| **Total** |  |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems |  |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively |  |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design |  |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results |  |
| **6** | 1. Skill of performing individual studies | 5 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 5 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 5 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 5 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 5 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 3 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 3 |
| b. Knowledge about legal regulations and standards of engineering | 3 |
| **10** | 1. Knowledge about project management, risk management and change management | 3 |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions | 3 |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Recovery of Wastes Researches | 151618534 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | The main aim of the course is to give the awareness of environmental concern, to establish the idea that the wastes are useful raw materials for the production of various materials, to teach the search of scientific references and use them to design and perform the laboratory studies, and to teach to prepare a comprehensive scientific report. |
| **Course Description** | Awareness of environmental concerns, basic information about wastes, waste management, waste evaluation, literature research on the recovery from a selected waste (liquid, solid or sludge) and application of the chosen recovery method in the laboratory, preparing a detailed report, poster presentation. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C, E, L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E, L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C, E, L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C, E, L |
| **5** | Collects and analyzes data by making experiments. | 5a, 6b | 3, 12, 13 | C, E, L |
| **6** | Makes report by evaluating the experimental results | 7a, 9a, 6b, 7c | 12, 15 | E, L |
| **7** | Orally present and defend the study in a poster form. | 7a, 6a, 6b, 7d | 11, 12, 15 | G, L |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Books on the environment, industrial waste and separation processes |
| **Other References** | Books on the environment, industrial waste and separation processes |
| **Tools and Equipment Required** | Laboratory equipment and chemicals if the experiments will not be carried out in a selected factory. The student must bring an apron, protective glasses, gloves and a mask. Poster presentation opportunity. projector for presentation |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm Exam (ORAL) | 20 |
| Homework 1 (Midterm Report) | 10 |
| Homework 2 (Poster) | 10 |
| Project (Thesis) | 20 |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Dr. Öğr. Üyesi UĞUR  SELENGİL |  |  |  |
| **Signature** |  |  |  |  |

8/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| [Research on Energy Conversion Technologies](#energy_conversion_techno) | 151618535 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | The course will be gain to the student a detailed knowledge on the selected subject and on the contemporary ıssues; an ability to design and conduct experiments and an ability to communicate orally and in writing effectively. |
| **Course Description** | In this course, a literatur survey is firstly made for a selected subject in the area of energy conversion techonology. Experimens are conducted on the subject. The results are presented as a BSc thesis. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1. Klass, D. L., “Biomass for Renewable Energy, Fuels, and Chemicals”, Academic Press,  1998. 2. Probstein, R. F., Hicks, R. E., “Synthetic Fuels”, McGraw-Hill Book Co., New  York, 1982 |
| **Other References** | 1. Kural, O., (editör), “Kömür” , İTÜ Maden Fakültesi, İstanbul, 1998. 2. Elliott, M.A.  (editör), “Chemistry of Coal Utilization”, John Wiley & Sons,1981. 3. Journals in energy  area. |
| **Tools and Equipment Required** | laboratory environment |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Evaluation of Wastes Research | 151618542 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | The aim is to learn waste evaluation methods, obtain experimental findings by applying one of these methods in the laboratory, and present these results as a detailed report. It is emphasized to understand the importance and benefit of the subject being studied in terms of the environment. |
| **Course Description** | Introducing wastes, waste evaluation methods, researching the evaluation methods of a selected waste (liquid or solid), applying one of the methods in the laboratory; preparation of a detailed report |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Periodicals covering waste and waste evaluation |
| **Other References** | Periodicals covering waste and waste evaluation |
| **Tools and Equipment Required** | - |

|  |  |
| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **DERSİN YÜRÜTÜCÜLERİ** | | | | |
| **Instructor(s)** | Prof. Dr. Hakan Demiral |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Synthesis and Characterization Research of New Generation Materials | 151618575 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Gain the ability to conduct and compile literature research on the subject to be studied; Developing the ability to obtain data by doing experimental work, making calculations, examining and interpreting the results, gaining the ability to express the results of theoretical research and experimental studies in written and oral form, gaining teamwork experience, material synthesis, characterization and purification, energy, etc. Giving information about the place, importance and applications of various processes in the chemical engineering discipline. |
| **Course Description** | Researching new generation materials, material synthesis, characterization, process design to be used in practice, optimization, engineering economics and planning. Collecting, analyzing, interpreting and presenting the data by using the synthesized new generation material in the designed process. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Walsh, F. C., Pletcher, D., Industrial Electrochemistry, Second Edition, The Electrosynthesis Co. Inc., NewYork, 1993.Electrochemical Water and Wastewater reatment. (2018). Hollanda: Elsevier Science.  1. Lowell, S. (2004). Characterization of Porous Solids and Powders: Surface Area, Pore Size and Density. Almanya: Springer. |
| **Other References** | Endüstriyel Atık Su Arıtımında Nanopartiküllerin Kullanımı. (2022). (n.p.): Efe Akademi Yayınları. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
|  | 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
|  | 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Dr. Öğretim Üyesi Canan ŞAMDAN |  |  |  |
| **Signature** |  |  |  |  |

01/11/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Inorganic Technologies Research | 151618566 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Credit** | **Credit** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | To ensure that they have knowledge on a selected subject within the scope of inorganic technologies, to enable the application of the information taught in this course and in previous courses, to teach literature research, to teach how to design and carry out experimental work, to give students experience in team work. |
| **Course Description** | Theoretical research, experimental study, report preparation on an inorganic technology. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Austin, G.T., Shreve’s Chemical Process Endustries, McGraw-Hill, New York, 1984.  Perry, R.H., Perry’s Chemical Engineering Handbook, McGraw-Hill, New York, 1984. |
| **Other References** | Books and articles obtained from libraries and online databases |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Değerlendirme** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Mine Özdemir |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Research in Synthetic Fuel Characterization | 151618537 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Learning how to conduct and compile literature research on the subject of characterization of the liquid product obtained from biomass by pyrolysis method; developing the ability to obtain results by conducting experiments on the given subject in the laboratory; interpreting the data obtained as a result of experimental studies and making them into written and oral presentations; To gain experience in analyzing and solving the issue by considering it as an engineering problem. |
| **Course Description** | Preparing a detailed report about the theoretical and experimental studies on the production and characterization of the liquid product from pyrolysis of biomass. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Probstein, R.F. and Hicks, E.R.,”Synthetic Fuels “, McGraw –Hill Book Company, New  York, 1982. |
| **Other References** | Periodicals, theses and literature related to the subject of study. |
| **Tools and Equipment Required** | Related raw material, experiment set, chemicals, glass material |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
|  |  |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
|  | 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
|  | 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Sait Yorgun |  |  |  |
| **Signature** |  |  |  |  |

1/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Alternative Energy Sources | 151618538 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Creating the necessary scientific infrastructure to solve relevant problems in Chemical Engineering by providing theoretical and practical information about adsorption and monitoring current information on the subject. |
| **Course Description** | Results are obtained by conducting literature research and experimental work on a subject determined within the scope of adsorption. These results are discussed and made into a written and oral presentation. |

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| **Dersin Öğrenim Çıktıları** | | **Katkı Sağladığı PÇ/PÇ’ler** | **Öğretim Yöntemleri \*** | **Ölçme Yöntemleri \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
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| **Textbook** | 1. Şen , Z, ‘’ Temiz enerji kaynakları’’, Su vakfı yayınları, İstanbul, 2002 |
| **Other References** | 1. Acaroğlu, M, ‘’ Alternatif Enerji Kaynakları’’, Atlas yayın dağıtım,2003.2. Relevant congress and symposium books. |
| **Tools and Equipment Required** | Related raw material, experiment set, chemicals, glass material |

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| **Dersin Haftalık Planı** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
|  |  |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
|  | 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
|  | 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Yürütücü** | Prof. Dr. Hilal Demir Kıvrak |  |  |  |
| **İmza** |  |  |  |  |

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Research of Industrial Raw Materials | 151618564 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| **Dersin Kategorisi (kredi dağılımı)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | The main purpose of the course is to provide knowledge about selected an industrial process and its raw materials. To making literature review on selected subject in this content, experiments are planned. Making experiments Findings are obtained. |
| **Course Description** | Literature investigation on subject related to an using industrial process are made. Recovery method for selected waste is determined. Experimental studies are carried out and reports are prepared. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
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| **Textbook** | Shreves chemical process industries, G. T. Austin, McGraw-Hill Book Co., 1984.Raw  materials for the glass industry, Metal Bulletin, 1997. |
| **Other References** | Various books and articles on the subject obtained from libraries or online databases. |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Ayşegül Aşkın |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Fuel Cell Technologies Research | 151618570 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Credit** | **Credit** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | To provide a full understanding of the performance characteristics of the components that make up fuel cell systems. To provide an understanding of the electrochemical processes occurring in fuel cells. To carry out studies to improve the performance of fuel cell systems. |
| **Course Description** | Obtaining information about fuel cell technologies. Conducting literature research to improve fuel cell performances, conducting experimental studies (catalyst synthesis, cyclic voltammetry (CV), chronoampermetry (CA) and electrochemical impedance spectroscopy (EIS) measurements to determine electrocatalytic activity, fuel cell applications), preparing the results in the form of a detailed report and presenting. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | H.D.Kivrak, “Yakıt Pili Katalizörleri” Gece Akademi. |
| **Other References** | R. O'Hayre, S. W. Cha, W. Collela, F. B. Prinz, “Fuel Cell Fundamentals” 3nd Ed, Wiley, 2016. Larminie J., Dicks A., “Fuel Cell System Explained”, Wiley. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Experimental Studies |
| **12** | Calculation of Experimental Results |
| **13** | Calculation of Experimental Results |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | - | - | - |
| Quiz | - | - | - |
| Quiz preparation | - | - | - |
| Oral Exam | - | - | - |
| Oral Exam prep | - | - | - |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  | - | - | - |
|  | - | - | - |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
|  |  |
| **Semester final exam (Oral jury examination)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 2 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology |  |
| **9** | 1. a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities |  |
| 1. b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Dr.Öğr.Üyesi Şefika KAYA |  |  |  |
| **Signature** |  |  |  |  |

22/8/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Research on Instrumental Methods in the Examination of Solids | 151618553 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Kredi** | **AKTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | A solid material to be selected or prepared and a device suitable for the examinations to be carried out on this material are determined and students are provided with detailed information about the device; Obtaining findings by conducting experimental studies and gaining the ability to evaluate the results by comparing them with the literature. |
| **Course Description** | Experimental studies are carried out to determine the properties of a solid material to be selected or prepared and a report is prepared. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b,6a,7b,8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d,6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a,6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b,6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 7a, 9a, 6b, 7c | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 7a, 6a, 6b, 7d | 11,12,15 | G,L |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1. Vikas, M., “Characterization Techniques for Polymer Nanocomposites”, Wiley, New York, 2012. 2. Favret, E. A., Fuentes, N.O., “Functional properties of bio-inspired surfaces: characterization and technological applications”, Hackensack, N.J. : World Scientific, 2009. |
| **Other References** | 1. McNair, H. M., Miller, J. M., “Basic Gas Chromatography, Wiley, 1998.  2. Garton, A., “Infrared Spectroscopy of Polymer Blends, Composites and Surfaces”, Oxford University Press, 1992.  3. Periodicals covering studies on methods used in the examination of solids. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **Dersin Haftalık Planı** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | |  |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Jury Exam (Poster) | 10 |
| Jury Exam (Thesis) | 20 |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Demet TOPALOĞLU YAZICI |  |  |  |
| **Signature** |  |  |  |  |

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Solid-Liquid Extraction | 151618539 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | To explain the principles of solid-liquid extraction, to provide application of the information taught in this course and previous courses, to teach literature research, to teach how to design and conduct experimental work, to give students experience in team work. |
| **Course Description** | Solid-liquid extraction methods, design, affecting variables, kinetics, equipment; Information about the mineral used in the experimental study; experimental study; editing and preparation of test reports, oral presentation and discussion. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | McCabe, W.L., Smith, J. C., Harriot, P., Unit Operations of Chemical Engineering,  Seventh Edition, McGraw-Hill, New York, 2005 |
| **Other References** | Other basic processes, mass transfer, chemical reaction engineering books, chemical engineering journals, publications of DPT and MTA. |
| **Tools and Equipment Required** | Batch reactor setup, laboratory coat and goggles required for solid-liquid extraction experiments. |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Wastewater Treatment Researches | 151618540 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | 90% of the courses of the first seven semesters and all vocational courses have been taken/are being taken |
| **Course Objectives** | The main purpose of the course is to provide knowledge about selected subject on wastewater treatment. To making experiments, obtaining findings on selected subject in related area and to understanding importance and benefit of subject for waste water treatment by students |
| **Course Description** | Experimental studies on given subject related to wastewater treatment are carry out and reports are prepared. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Kara, S., Yıldırım, M.E., Tuncel, M., Kıvanç, M., Tamer, Ü., Özdemir, A., Kaytakoğlu, S.,  Ergun, B., Döğeroğlu, T., Var, F., Uygan., N., Tezcan, Ü., Lüle, M., “Çevre Sağlığı”, (Ed:  N. Varcan), Anadolu Üniversitesi, Açık Öğretim Fakültesi Yayınları, 1995. |
| **Other References** | 1. Karpuzcu, M., “Çevre Kirlenmesi ve Kontrolü”, Dördüncü baskı, İstanbul, 1994.2.  Eckenfelder, W. W., “Industrial Water Pollution Control”, McGraw Hill, 1989.3.  Various books and articles on the subject obtained from libraries or online databases. |
| **Tools and Equipment Required** | Lab coat, gloves. |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

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Açıklama otomatik olarak oluşturulduESOGÜ KİMYA MÜHENDİSİLİĞİ BÖLÜMÜ**

**DERS BİLGİ FORMU**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Energy Storage Materials Research | 151618569 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | 90% of the courses of the first seven semesters and all vocational courses have been taken/are being taken |
| **Course Objectives** | In order to effectively use batteries, supercapacitors and fuel cells, which are the main energy storage devices, the materials used must be researched and developed. In this context, it is aimed to research new electrode and electrolyte materials. |
| **Course Description** | Experimental studies are carried out using electrochemical methods on energy storage materials, new materials are obtained, and a report is prepared using the data obtained and made into an oral and written presentation. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

|  |  |
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| **Textbook** | Huggins, R., “Energy Storage: Fundamentals, Materials and Applications”, Springer, 2010. |
| **Other References** | 1. Zito, R., “Energy Storage: A New Approach”, John Wiley & Sons, 2010.  2. Burheim, O. S., “Engineering Energy Storage”, Academic Press, 2017.  3. Periodicals, theses and papers on the subject. |
| **Tools and Equipment Required** | Computer and laboratory equipment. The student must bring an apron, gloves and protective glasses. |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Dr. Öğr. Üyesi Salim Erol |  |  |  |
| **Signature** |  |  |  |  |

01/07/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Electrochemical Methods Research | 151618543 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Gain the ability to conduct and compile literature research on the subject to be studied; To develop the ability to obtain data by doing experimental work, to make calculations, to analyze and interpret the results, to gain the ability to express the results of theoretical research and experimental studies in written and oral form, to gain teamwork experience, giving information about the place, importance and applications of electrochemical methods in the discipline of chemical engineering. |
| **Course Description** | An experimental study is carried out using electrochemical methods on a determined subject, and a report is prepared using the data obtained and made into an oral and written presentation. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Walsh, F. C., Pletcher, D., Industrial Electrochemistry, Second Edition, The  Electrosynthesis Co. Inc., NewYork, 1993. |
| **Other References** | 1. Walsh, F. C., A First Course in Electrochemical Engineering, The Electrosynthesis Co.  Inc., NewYork, 1993.2. Periodicals, theses and papers on the subject. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Belgin Karabacakoğlu |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Polymer Technologies Research | 151618536 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Students should have detailed knowledge about the selected polymer; Obtaining findings by conducting theoretical and experimental studies on this subject, providing students with experience working in groups and teaching how to prepare a comprehensive scientific report. |
| **Course Description** | Conducting theoretical and experimental studies on polymers and preparing a detailed report |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | All kinds of resources on the subject. |
| **Other References** | All kinds of resources on the subject |
| **Tools and Equipment Required** | Related raw material, experiment set, chemicals, glass material |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Polymer Synthesis and Characterization Research | 151618554 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Students should have detailed knowledge about polymerization reactions, purification and characterization of polymers. |
| **Course Description** | Experiments are carried out in a laboratory discipline on polymer synthesis and characterization, starting from a selected monomer, and the experimental studies are prepared as a detailed report. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | Saçak M, Polimer Kimyası, Gazi Kitapevi, 2004. |
| **Other References** | Periodicals about polymers and all kinds of resources on the subject |
| **Tools and Equipment Required** | Computer, projector, laboratory environment and facilities |

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| **Dersin Haftalık Planı** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Musa Şölener |  |  |  |
| **Signature** |  |  |  |  |

1/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| **Adsorption Researches** | 151618546 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

|  |  |
| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | To form the scientific infrastructure required for solving problems in chemical engineering by given the theoretical and experimental information about the adsorption and following up-to-date information about this subject. |
| **Course Description** | The literature survey and experimental study on a selected subject related to adsorption is performed and the experimental results are obtained. These results are discussed and presented as written and oral form. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
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| **10** |  |  |  |  |

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| **Textbook** | Ruthven, D. M., “Principles of Adsorption and Adsorption Processes”, Wiley-Interscience Publication, New York, 1984. |
| **Other References** | 1. Gregg, S. J. and Sing, K. S. W., “Adsorption, Surface Area and Porosity”, Academic Pres, London, 1982.  2. Rouquerol, F., Rouquerol, J. and Sing, K., “Adsorption by Powders and Porous Solids”, Academic Press, London, 1999.  3. Crittenden, B. and Thomas, W. J., “Adsorption Technology and Design”, Butterworth-Heinemann, Oxford, 1998.  Databases and periodicals |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Fatma Tümsek |  |  |  |
| **Signature** |  |  |  |  |

1/7/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Characterization of Porous Solids Research | 151618547 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | To understand the significance of characterization of porous solids. To perform literature survey and experimental study on a selected subject and to be able to obtain the results of the study and discuss, conclude and present the results. |
| **Course Description** | Experimental studies are done related of characterization of porous solids and the report is prepared. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
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| **Textbook** | Duncan W. Bruce, Dermot O’Hare, Richard I. Walton, Porous Materials, Porous Materials  Inorganic Materials, John Wiley & Sons, 2010 |
| **Other References** | 1. Kaufmann, E. N., “Characterization of Materials Vol. 1”, John Wiley and Sons, 2003.2.  Kaufmann, E. N., “Characterization of Materials Vol. 2”, John Wiley and Sons, 20033.  McCabe, W. L., Smith, J. C., Harriott, P., “Unit Operations of Chemical Engineering”, 5th  edition, McGraw-Hill Book Company, New York, 1993.4. Periodicals covering porous solids and their properties |
| **Tools and Equipment Required** |  |

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| **Dersin Haftalık Planı** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Ceyda Bilgiç |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Ion Exchange and Adsorption | 151618548 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Development of environmental awareness of students by making them familiar about a subject chosen in the context of water pollutant removal; gaining them the ability to make theoretical and experimental studies about this subject, analyze the data, interprete and prepare a comprehensive scientific report |
| **Course Description** | Theoretical information on the advanced wastewater treatment techniques such as adsorption method, ion exchange method and membrane techniques, experimental studies on the parameters affecting the used methods yield, preparation of test reports, oral presentation. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
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| **Textbook** | Treybal, R. E., “Mass-Transfer Operations”, McGraw-Hill International Book Company,  New York, 1968 |
| **Other References** | 1. “Standart Methods For The Examination Water and Wastewater”, 16th edition, APHA  INC. 1740 Broadway, New York, 1985. 2. McCabe, W. L., Smith, J. C., Harriott, P., “Unit  Operations of Chemical Engineering”, 5th edition, McGraw-Hill Book Company, New  York, 1993. |
| **Tools and Equipment Required** | Experimental equipment required for the experimental study, apron, protective glasses, gloves, mask, calculator. |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
| Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Duygu Kavak |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

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Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Experimental Design in Chemical Engineering Research | 151618550 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | The aim is to learn the subject of experimental design and emphasize its importance in solving problems in the field of chemical engineering. |
| **Course Description** | Planning an experimental study to identify and solve a problem, carrying out the experiments and statistically evaluating the obtained data. |

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| **Dersin Öğrenim Çıktıları** | | **Katkı Sağladığı PÇ/PÇ’ler** | **Öğretim Yöntemleri \*** | **Ölçme Yöntemleri \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1, 2 | C, E, L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E, L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C, E, L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C, E, L |
| **5** | Collects and analyzes data by making experiments. | 5a, 6b | 3, 12, 13 | C, E, L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 9a, 7c | 12, 15 | E, L |
| **7** | Orally present and defend the study in a poster form. | 6b, 7a, 9a, 7c | 11, 12, 15 | G, L |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| --- | --- |
| **Textbook** | Lazic, Z. R. “Design of Experiments in Chemical Engineering: a Practical Guide, Weinheim, Wiley-VCH, 2004 |
| **Other References** | 1.Montgomery, D. C., “Design and Analysis of Experiments”, 5th ed., New York, J. Wiley, 2001. 2.Roy, R. K., “Design of Experiments Using the Taguchi Approach: 16 Steps to Product and Process Improvement”, New York, J. Wiley, 2001. 3.Barrentine, L. B., “An Introduction to Design of Experiments: a Simplified Approach”, ASQ Quality Press, Milwaukee, 1999. |
| **Tools and Equipment Required** | - |

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| **Dersin Haftalık Planı** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Doç. Dr. Uğur MORALI |  |  |  |
| **Signature** |  |  |  |  |

11/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Evaluation of Biomass Research | 151618551 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

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| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Performing an experimental study on the selected biomass to obtain bio-oil, char and gas by various methods, obtaining and concluding experimental data. |
| **Course Description** | Gaining thorough the knowledge about biomass and evaluation of the biomass. Performing experimental studies on the selected subject and preparing a detailed scientific report, evaluation of the products obtained from experimental studies according to the physical properties and chemical structure. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1, 2 | C, E, L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E, L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C, E, L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C, E, L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C, E, L |
| **6** | Makes report by evaluating the experimental results | 7a, 9a, 6b, 7c | 12, 15 | E, L |
| **7** | Orally present and defend the study in a poster form. | 7a, 6a, 6b, 7d | 11, 12, 15 | G, L |
| **8** |  |  |  |  |
| **9** |  |  |  |  |
| **10** | - |  |  |  |

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| **Textbook** | Probstein, R.F., Hicks, R.E., “Synthetic Fuels”, McGraw-Hill Book Co., 1982 |
| **Other References** | 1. Klass, D. L., “Biomass for Renewable Energy, Fuels, and Chemicals”, Academic Press, 1998. 2. Wereko-Brobby, C.Y., Hagan, E. B., “Biomass Conversion and Technology”, J. Wiley, 1996. 3. Acaroğlu, M., “Alternatif Enerji Kaynakları”, Atlas yayın dağıtım, 2003. 4. Periodicals covering studies on biomass and conversion methods |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | - | - | - |
| Quiz | - | - | - |
| Quiz preparation | - | - | - |
| Oral Exam | - | - | - |
| Oral Exam prep | - | - | - |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Jury exam (poster) | 10 |
| Jury exam (thesis) | 20 |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. İlknur Demiral |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Sorptıon Processes For Water TreatmentResearches | 151618552 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | The main goal of the course; To provide students with detailed information on a selected subject within the scope of water treatment processes, to conduct an experimental study on a selected subject in this field and obtain the findings, and to define the importance and benefit of the studied subject in terms of environmental sciences and technologies. |
| **Course Description** | An experimental study is carried out and a report is prepared on the usability of adsorption or ion exchange technology in water and wastewater treatment in the laboratory and industry. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1.Helfferich, F., “Ion Exchange”, McGraw-Hill, 1962.2.Weber, Jr., W. J.,  “Physicochemical Processes for Water Quality Control”,Wiley-Interscience, New York,  1972. |
| **Other References** | Periodicals covering studies on water purification. |
| **Tools and Equipment Required** |  |

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| --- | --- |
| **Dersin Haftalık Planı** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Sözlü jüri sınavı)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
|  | 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
|  | 1. Skill of effective presentation and giving and getting clear and understandable instructions. |  |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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

7/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Industrial Waste and Residue Evaluation Research | 151618555 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| --- | --- |
| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | To ensure that students have detailed information about industrial wastes and residues and the evaluation of these wastes and residues; To provide students with the ability to analyze, interpret and turn data into a comprehensive scientific report by conducting an experimental study on a chosen topic in this field; To make people understand the importance and benefit of the subject studied in terms of environmental health and safety |
| **Course Description** | Industrial wastes, their sources and characteristics; industrial residues; Information about the waste or residue to be used in the experimental study; experimental study; editing and preparation of test reports, oral presentation and discussion. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Gönüllü, M.T., Endüstriyel Kirlenme Kontrolü, Birsen Yayınevi, İstanbul, 2004.. |
| **Other References** | 1. Freeman, H.M., Industrial Pollution Prevention Handbook, McGraw Hill, New York,  1995.2. Lund, H.F., Industrial Pollution Control Handbook, McGraw-Hill, New York,  1971.3. Wang, L.K., Wang, M.H.S., Handbook of Industrial Waste Treatment, Marcel  Dekker, New York, 1992.4. Konu ile ilgili süreli yayınlar. |
| **Tools and Equipment Required** | Experimental setups required for experimental work. The student must bring an apron, protective glasses, gloves and a mask. |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

|  |  |  |
| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. İlker KIPÇAK |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Name** |
| Soil and Water Pollution Research | 151618556 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
| - | 2 | - | 1 | - |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | The main goal of the course; To have detailed knowledge about the removal of pollutants from soils and wastewater. Conducting an experimental study on this subject and obtaining findings and understanding the importance and benefit of the subject studied in terms of the environment. |
| **Course Description** | Experimental studies are conducted and a report is prepared within the scope of the removal of pollutants from soil and wastewater. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1, 2 | C, E, L |
| **2** | Examines the literature regarding the workspace | 4b, 6a, 7b, 8 | 11 | E, L |
| **3** | Uses the previous information for the workspace | 1d, 6a | 3, 6, 10, 11 | C, E, L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C, E, L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C, E, L |
| **6** | Makes report by evaluating the experimental results | 7a, 9a, 6b, 7c | 12, 15 | E, L |
| **7** | Orally present and defend the study in a poster form. | 7a, 6a, 6b, 7d | 11, 12, 15 | G, L |
| **8** | - | - | - | - |
| **9** | - | - | - | - |
| **10** | - | - | - | - |

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| **Textbook** | 1. Mckay, G., Use of adsorbents for the removal of pollutants from wastewaters, CRC Pess Inc, 186 p. 1996.2. Standard methods for the examination of water and wastewater, Water Works Association, Water Environment Federation, 18 th ed. – Washington, D.C. : American Public Health Association, 1992. |
| **Other References** | 1. Chiou, C. T., Partition and adsorption of organic contaminants in environmental systems, New York : J. Wiley, 20022. Çepel, N., Toprak kirliliği, erozyon ve çevreye verdiği zararlar, İstanbul TEMA Vakfı yayınları, 1997.3. Treybal, R.E., Mass-transfer operations, McGraw-Hill, Kogakusha, Tokyo, 784 p. 1980. |
| **Tools and Equipment Required** | - |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Necessary Preparations for Experimental Study |
| **3** | Necessary Preparations for Experimental Study |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework | - | - | - |
| Quiz | - | - | - |
| Quiz preparation | - | - | - |
| Oral Exam | - | - | - |
| Oral Exam prep | - | - | - |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  | - | - | - |
|  | - | - | - |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
|  |  |
| **Semester final exam** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof.Dr.Yeliz AŞÇI |  |  |  |
| **Signature** |  |  |  |  |

13/7/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Researches of Sythesis and Characretorization of Catalysts | 151618560 |

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| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Having thoroughly information about selected subject; obtaining the findings with doing theoretical and experimental studies about this subject and gaining the ability to analyze and interpret experimental data. Gaining the working experience in groups, the ability to use measuring devices used during the experiment reliably and the ability to prepare a comprehensive scientific report |
| **Course Description** | The scientific basis of the solid catalyst synthesis methods, bulk and supported catalysts,support materials, catalyst characterization techniques and, deactivation and regeneration of the catalyst. Removal, dyes, or heavy metals in waste water by catalysts sythesized or examination of the surface characterization of catalyst by gas chromatography |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | 1. Richardson T. J., Principles of Catalysts Development, FAC, Plenum Press, N.Y.  1989.2. Gates B. C., Catalytic Chemistry, Wiley &Sons, Inc. NY., 1992 3. Regalbuto,  J.,Catalyst Preparation Science and Engineering,CRC Press, 2007. |
| **Other References** | 1.Carberry, J.J., Chemical and Catalytic Reaction Engineering, Dover Publications,  2001.2.Levenspiel, O.; Chemical Reaction Engineering, John Wiley &Sons. 3.Fogler  H.S., “Elements of Chemical Reaction Engineering”, Prentice-Hall International Inc.,  Second Edition. 4.Periodical journals |
| **Tools and Equipment Required** | Experimental setups required for experimental work. The student must bring an apron, protective glasses, gloves and a mask. |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

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| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge | 1 |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports | 1 |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Alime Çıtak |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

|  |  |
| --- | --- |
| **Course Name** | **Course Code** |
| Chemical Technologies Research | 151618561 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| --- | --- | --- | --- | --- |
| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 2 |  | 1 |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Gain the ability to conduct and compile literature research on the subject to be studied; To develop the ability to obtain data by doing experimental work, to make calculations, to analyze and interpret the results, to gain the ability to express the results of theoretical research and experimental studies in written and verbal form, to gain teamwork experience, giving information about the place, importance and applications of electrochemical methods in the discipline of chemical engineering. |
| **Course Description** | An experimental study is carried out using electrochemical methods on a determined subject, and a report is prepared using the data obtained and made into an oral and written presentation. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| --- | --- |
| **Textbook** | - |
| **Other References** | Databases and periodicals |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **16-17** | **FINAL EXAM** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calculation of Course Workload** | | | |
| **Activities** | **Number** | **Duration (hr)** | **Total Workload (hr)** |
| Course Duration (total weekly course hours) | 14 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
|  |  |  |  |
|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |

|  |  |
| --- | --- |
| **Assessment** | |
| **Semester activities** | **%** |
| Midterm (Oral) | 20 |
| Midterm Report | 10 |
| Poster Presentation | 10 |
| Project Report | 20 |
| **Semester final exam (Oral jury exam)** | 40 |
| **Total** | 100 |

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| --- | --- | --- |
| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Prof. Dr. Macid Nurbaş |  |  |  |
| **Signature** |  |  |  |  |

15/8/2022

**amblem, simge, sembol, daire, metin içeren bir resim

Açıklama otomatik olarak oluşturulduESOGÜ CHEMICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

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| --- | --- |
| **Course Name** | **Course Code** |
| Resource and Energy Recovery from Solid Wastes Research | 151618562 |

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| --- | --- | --- | --- | --- |
| **Semester** | **Weekly Course Period** | | **Credit** | **ECTS** |
| **Theory** | **Practice** |
| 8 | 1 | 4 | 3 | 6 |

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| **Course Catagory (credit distribution)** | | | | |
| **Maths and Basic Sciences** | **Engineering Sciences** | **Engineering Design** | **General Education** | **Social Sciences** |
|  | 3 |  |  |  |

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

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| **Prerequieite(s)** | Must have taken and succeeded in the Engineering Research Preparation Course. |
| **Course Objectives** | Creating the necessary scientific infrastructure for the solution of relevant problems in Chemical Engineering by providing theoretical and practical information about the evaluation of materials obtained from solid waste in alternative energy applications and monitoring current information within the scope of the subject. |
| **Course Description** | Results are reached by conducting literature research and experimental study on a subject determined within the scope of alternative energy. These results are discussed and made into a written and oral presentation. |

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| **Course Outcomes** | | **Contributed program outcomes** | **Education Methods\*** | **Assessment Methods \*\*** |
| **1** | Explains the importance of the study subject. | 8 | 1,2 | C,E,L |
| **2** | Examines the literature regarding the workspace. | 4b, 6a, 7b, 8 | 11 | E,L |
| **3** | Uses the previous information for the workspace. | 1d, 6a | 3, 6, 10, 11 | C,E,L |
| **4** | Designs an experiment about the studying subject. | 5a, 6b | 3, 12, 13 | C,E,L |
| **5** | Collects and analyzes data by making experiments. | 5b, 6b | 3, 12, 13 | C,E,L |
| **6** | Makes report by evaluating the experimental results | 6b, 7a, 7c, 9 | 12, 15 | E,L |
| **7** | Orally present and defend the study in a poster form. | 6a, 6b, 7a, 7d | 11, 12, 15 | G,L |
| **8** | . |  |  |  |
| **9** |  |  |  |  |
| **10** |  |  |  |  |

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| **Textbook** | Pascal Van Der Voort, Karen Leus, Els De Canck “Introduction to Porous Materials”, Wiley-Interscience Publication, 2009. |
| **Other References** | 1.Kıvrak, H.D., “Yakıt Pili Katalizörleri”, Gece Akademi.  2. Databases and periodicals |
| **Tools and Equipment Required** |  |

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| **COURSE SYLLABUS** | |
| **1** | Giving Information About the Course and Determining the Project Topic |
| **2** | Carrying out a literature study on the subject |
| **3** | Carrying out a literature study on the subject |
| **4** | Necessary Preparations for Experimental Study |
| **5** | Experimental Studies |
| **6** | Experimental Studies |
| **7** | Experimental Studies |
| **8** | **MIDTERM** |
| **9** | Experimental Studies |
| **10** | Experimental Studies |
| **11** | Calculation of Experimental Results |
| **12** | Calculation of Experimental Results |
| **13** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **14** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **15** | Compiling and Writing the Theoretical and Experimental Information on the Subject and Turning It into a Report |
| **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 | 5 | 70 |
| Class Study time (revision, reinforcement, pre-study,….) | 14 | 2 | 28 |
| Homework |  |  |  |
| Quiz |  |  |  |
| Quiz preparation |  |  |  |
| Oral Exam |  |  |  |
| Oral Exam prep |  |  |  |
| Report (including preparation and presentation time) | 1 | 10 | 10 |
| Project (including preparation and presentation time) | 1 | 40 | 40 |
| Presentation (including preparation time) | 1 | 20 | 20 |
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|  |  |  |  |
| Midterm | 1 | 1 | 1 |
| Midterm Exam preparation | 1 | 10 | 10 |
| Semester final exam | 1 | 1 | 1 |
| Final exam preparation | 1 | 10 | 10 |
|  | **Total workload** | | **190** |
|  | **Total workload / 30** | | **6.3** |
|  | **Course ECTS Credits** | | **6** |
| **Assessment** | | | |
| **Semester activities** | **%** | | |
| Midterm (Oral) | 20 | | |
| Midterm Report | 10 | | |
| Poster Presentation | 10 | | |
| Project Report | 20 | | |
| **Semester final exam (Oral jury exam)** | 40 | | |
| **Total** | 100 | | |

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| **THE RELATIONSHIP BETWEEN COURSE LEARNING OUTCOMES AND PROGRAM OUTCOMES (PO)** (5: Very high, 4: High, 3: Medium, 2: Low, 1: Very low) | | |
| **Num** | **PROGRAM OUTCOME** | **Contribution** |
| **1** | 1. Sufficient knowledge of mathematics |  |
| 1. Sufficient knowledge of basic sciences |  |
| 1. Sufficient basic engineering and chemical engineering knowledge |  |
| 1. Skill of applying all these knowledge and experience to complicated chemical engineering problems | 1 |
| **2** | Skill of defining, identifying, formulating and solving the complicated problems in chemical engineering and related areas by applying appropriate analysis and modelling methods. |  |
| **3** | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions. |  |
| **4** | To analyze and solve the complicated engineering problems: |  |
| 1. skill of developing, selecting and applying the required techniques and devices |  |
| 1. skill of using information technologies effectively | 1 |
| **5** | To study the complicated on the complicated chemical engineering problems and research subjects: |  |
| 1. skill of experimental design | 1 |
| 1. skill of performing the experiments, collecting the data and analyzing and interpreting the results | 1 |
| **6** | 1. Skill of performing individual studies | 3 |
| 1. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies | 3 |
| **7** | 1. Skill of effective oral and writing communication in Turkish | 2 |
| 1. Skill of improving and using foreign language knowledge |  |
| 1. Skill of effective reporting, understanding the reports and preparing the design and production reports |  |
| 1. Skill of effective presentation and giving and getting clear and understandable instructions. | 1 |
| **8** | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology | 2 |
| **9** | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities | 1 |
| b. Knowledge about legal regulations and standards of engineering |  |
| **10** | 1. Knowledge about project management, risk management and change management |  |
| 1. Awareness of the significance of entrepreneurship and innovation |  |
| 1. Knowledge about sustainable development |  |
| **11** | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of chemical engineering; and awareness of the legal issues resulting from engineering solutions |  |

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| **INSTRUCTOR(S)** | | | | |
| **Instructor(s)** | Dr. Öğr. Üyesi Derya Yıldız |  |  |  |
| **Signature** |  |  |  |  |

1/7/2022