| Curriculum | | T | P | ECTS |
|---|---|---|---|---|
| **1 st Semester** | | | | |
| CHE103 | General Chemistry | 3 | 2 | 5 |
| KRY111 | Career Planning | 1 | 0 | 1 |
| HIST101 | Principles of Atatürk and History of Turkish Revolution I | 2 | 0 | 2 |
| ENG101 | English For Academic Purposes I | 4 | 0 | 3,5 |
| CHE101 | Introduction to Chemical Engineering | 2 | 0 | 2 |
| MATH151 | Calculus I | 4 | 2 | 7 |
| ME108 | Computer Aided Solid Modeling | 1 | 3 | 4,5 |
| PHYS101 | General Physics I | 3 | 2 | 6 |
| **2 nd Semester** | | | | |
| PHYS102 | General Physics II | 3 | 2 | 6 |
| HIST221 | History of Civilization | 3 | 0 | 3 |
| CHE104 | General Chemistry | 3 | 2 | 4,5 |
| ENG102 | English for Academic Purposes II | 4 | 0 | 3,5 |
| MATH152 | Calculus II | 4 | 2 | 7 |
| CMPE102 | Computer Programming | 2 | 2 | 4 |
| HIST102 | Principles of Atatürk and History of Turkish Revolution II | 2 | 0 | 2 |
| **3 rd Semester** | | | | |
| CHE201 | Analytical Chemistry | 3 | 2 | 6 |
| ENE203 | Thermodynamics I | 3 | 0 | 6 |
| ENG201 | English for Academic Purposes III | 3 | 0 | 3 |
| | General Elective | 3 | 0 | 4 |
| CHE203 | Physical Chemistry | 3 | 2 | 5 |
| MATH275 | Linear Algebra | 4 | 0 | 6 |
| **4 th Semester** | | | | |
| ENG202 | English for Academic Purposes IV | 3 | 0 | 3 |
| CHE210 | Inorganic Chemistry | 3 | 0 | 5 |
| CHE208 | Chemical Process Calculations | 3 | 2 | 6 |
| | General Elective | 3 | 0 | 4 |
| CHE202 | Organic Chemistry | 3 | 2 | 6 |
| MATH276 | Differential Equations | 4 | 0 | 6 |

**5 th Semester**

| | | | | |
|---|---|---|---|---|
| CHE399 | Summer Practice I | 0 | 0 | 6 |
| ENG301 | English for Occupational Purposes I | 3 | 0 | 3 |
| MATH380 | Numerical Methods for Engineers | 3 | 1 | 5 |
| CHE303 | Chemical Reaction Engineering I | 3 | 0 | 5 |
| AE307 | Fluid Mechanics | 3 | 1 | 6 |
| ENE301 | Heat Transfer | 3 | 1 | 6 |
| CHE311 | Fundamentals of Mass Transfer | 3 | 0 | 5 |

**6 th Semester**

| | | | | |
|---|---|---|---|---|
| ENG302 | English for Occupational Purposes II | 3 | 0 | 3 |
| CHE312 | Biochemistry | 3 | 0 | 5 |
| | Area Elective (1) | 3 | 0 | 5 |
| CHE302 | Separation Processes | 3 | 2 | 6 |
| | Area Elective (5) | 3 | 0 | 5 |
| CHE304 | Chemical Reaction Engineering II | 3 | 2 | 6 |

**7 th Semester**

| | | | | |
|---|---|---|---|---|
| CHE407 | Process Modeling, Dynamics and Control | 3 | 1 | 6 |
| CHE405 | Chemical Engineering Design I | 3 | 2 | 7 |
| | General Elective | 3 | 0 | 4 |
| CHE499 | Summer Practice II | 0 | 0 | 6 |
| | Area Elective (3) | 3 | 0 | 5 |
| TURK401 | Turkish Language I | 2 | 0 | 2 |
| CHE401 | Chemical Engineering Laboratory I | 0 | 4 | 6 |

**8 th Semester**

| | | | | |
|---|---|---|---|---|
| | Area Elective (2) | 3 | 0 | 5 |
| TURK402 | Turkish Language II | 2 | 0 | 2 |
| CHE406 | Chemical Engineering Design II | 1 | 4 | 7 |
| | Area Elective (4) | 3 | 0 | 5 |
| CHE402 | Chemical Engineering Laboratory II | 0 | 4 | 6 |
| | Area Elective (6) | 3 | 0 | 5 |

(1) CEAC571, CEAC533, ENE306, CEAC529, CEAC554, MATE474, CEAC577, CEAC578, ENE421, CEAC509, CEAC502, CEAC503, CEAC504, MATE310, CEAC572, MFGE432, MFGE484, CEAC575, CEAC507, CEAC574, CEAC419, CEAC311, AET305, AET315, AET325, AET335, AET345, AET355, AET365, AET405, AET415, AET425, AET435, AET445, CEAC557, ENE412, MATE462, CEAC404, CEAC412, CEAC417, CEAC418, CEAC423, CEAC442, CEAC424, CEAC431, CEAC420, CEAC474, CEAC470, CHE416, MATE470, ENE303, CHE491, CHE493, CHE495,

(2) CEAC571, CEAC533, ENE306, CEAC424, CEAC470, CEAC529, CEAC412, CEAC442, CEAC418, CEAC420, CEAC431, MATE462, AET305, AET315, AET325, AET405, AET415, CEAC578, CEAC554, CEAC577, CEAC557, ENE412, MATE474, CEAC423, CEAC404, CEAC417, CEAC474, ENE421, CEAC509, CEAC503, CEAC502, CEAC504, MATE310, CEAC572, MFGE432, CEAC574, CEAC575, MFGE484, CEAC507, CEAC419, CEAC311, CHE416, MATE470, ENE303, CHE491, CHE493, CHE495,

(3) CEAC571, CEAC533, ENE306, CEAC424, CEAC470, CEAC529, CEAC412, CEAC578, CEAC442, CEAC418, CEAC420, CEAC431, MATE462, AET305, AET315, AET325, AET405, AET415, ENE421, CEAC554, MATE474, CEAC577, ENE412, CEAC417, CEAC474, CEAC404, CEAC423, CEAC557, CEAC502, CEAC503, CEAC504, CEAC509, MATE310, CEAC572, MFGE432, CEAC507, CEAC575, CEAC574, MFGE484, CEAC419, CEAC311, CHE416, MATE470, ENE303, CHE491, CHE493, CHE495,

(4) IE447, IE445, IE446, MECE322, MATE462, AET305, AET315, AET325, ME488, IE443, ENE308, ENE312, ENE430, IE314, IE322, ISE432, MATE460, MECE422, MFGE405, MFGE420, MFGE481, MFGE482, SE375, SE426, SE446, CMPE468, MATE458, EE449, AET355, AET365, AET335, AET345,

(5) CEAC571, CEAC533, ENE306, AET305, AET315, AET325, AET335, AET345, AET355, AET365, AET405, AET415, AET425, AET435, AET445, CEAC557, ENE412, MATE462, CEAC404, CEAC412, CEAC417, CEAC418, CEAC423, CEAC442, CEAC424, CEAC431, CEAC420, CEAC474, CEAC470, CEAC529, CEAC554, MATE474, CEAC577, CEAC578, ENE421, CEAC509, CEAC502, CEAC503, CEAC504, MATE310, CEAC572, MFGE432, MFGE484, CEAC575, CEAC507, CEAC574, CEAC419, CEAC311, CHE416, MATE470, ENE303, CHE491, CHE493, CHE495,

(6) CEAC571, CEAC533, ENE306, CEAC424, CEAC470, CEAC529, CEAC412, CEAC442, CEAC418, CEAC420, CEAC431, MATE462, AET305, AET315, AET325, AET405, AET415, CEAC578, CEAC554, CEAC577, CEAC557, ENE412, MATE474, CEAC423, CEAC404, CEAC417, CEAC474, ENE421, CEAC509, CEAC503, CEAC502, CEAC504, MATE310, CEAC572, MFGE432, CEAC574, CEAC575, MFGE484, CEAC507, CEAC419, CEAC311, CHE416, MATE470, ENE303, CHE491, CHE493, CHE495,

## General Electives

ART268, MAN414, MAN412, GET304, GET305, GET314, GET315, GET324, GET325, GET334, GET335, GET344, GET345, GET354, GET355, GET364, GET374, GET384, GET394, GET404, GET405, GET414, GET415, GET424, GET425, GET434, MAN437, MAN328, ART265, ART269, ART270, HUM322, HUM323, HUM204, ENG395, HUM319, MAN313, MAN408, ART228, PR419, HUM412, HUM105, GET306, GET316, GET326, GET336, GET346, GET406, GET416, GET426, GET436, ART271, ART201, ART221, ART222, ART223, ART224, ART225, ART251, ART252, ART291, ART292, FRE201, FRE202, FRE301, FRE302, FRE401, FRE402, GER201, GER202, GER301, GER302, GER401, GER402, HUM201, HUM211, JAP201, JAP202, JAP301, JAP302, RUS201, RUS202, RUS301, RUS302, SPAN201, SPAN202, SPAN301, SPAN302, ART235, CHIN301, MAN409, MAN415, ART294, CHIN202, PR491, PR492, ART202, ART293, CHIN201, MAN428, KOR201, LAW250, CHIN302, ART267, HUM312, HUM360, HUM320, HUM331, ART282, HUM316, ART284, IR423, HUM321, ECON442, HUM212, SPAN402, RUS402, ART287, ART285, ART286, RUS401, SPAN401, ART288, ECON325, AVM490, ART297, ART289, MAN374, KOR202, ART295, HUM291, ART261, ART298, ECON318, ART266, KOR301, HUM310, ART226, HUM202, ART262, ART264, ART227,

## Area Elective Course List

| | | |
|---|---|---|
| AET 305 | Area Elective Course | (0-0)5 |
| AET 315 | Area Elective Course | (0-0)5 |
| AET 325 | Area Elective Course | (0-0)5 |

| | | |
|---|---|---|
| AET 335 | Area Elective Course | (0-0)5 |
| AET 345 | Area Elective Course | (0-0)5 |
| AET 355 | Area Elective Course | (0-0)5 |
| AET 365 | Area Elective Course | (0-0)5 |
| AET 405 | Area Elective Course | (0-0)5 |
| AET 415 | Area Elective Course | (0-0)5 |
| AET 425 | Area Elective Course | (0-0)5 |
| AET 435 | Area Elective Course | (0-0)5 |
| AET 445 | Area Elective Course | (0-0)5 |
| CEAC 311 | Fundamentals of Mass Transfer | (3-0)5 |
| CEAC 404 | Graduation Project | (1-4)5 |
| CEAC 412 | Bioinorganic Chemistry | (3-0)5 |
| CEAC 417 | Pharmacology and Toxicology | (3-0)5 |
| CEAC 418 | Applied Polymer Science | (2-2)5 |
| CEAC 419 | Transport Phenomena | (3-0)5 |
| CEAC 420 | Nanoscience and Nanotechnology | (3-0)5 |
| CEAC 423 | Polymer Science and Technology | (3-0)5 |
| CEAC 424 | Conjugated Polymers I: Design, Synthesis and Characterization | (3-0)5 |
| CEAC 431 | Plastic Materials | (3-0)5 |
| CEAC 442 | Environmental Pollution | (3-0)5 |
| CEAC 470 | Petrochemical Engineering | (3-0)5 |
| CEAC 474 | Electrochemistry | (3-0)5 |
| CEAC 502 | Advanced Biochemistry | (3-0)5 |
| CEAC 503 | Advance Inorganic Chemistry | (3-0)5 |
| CEAC 504 | Advanced Analytical Chemistry | (3-0)5 |
| CEAC 507 | Advanced Chemical Reaction Engineering | (3-0)5 |
| CEAC 509 | Advanced Heat and Mass Transfer | (3-0)5 |
| CEAC 529 | Spectroscopic Techniques | (3-0)5 |
| CEAC 533 | Mathematical Modeling in Chemical Engineering | (3-0)5 |
| CEAC 554 | Electrochemical Methods: Fundamentals and Applications | (3-0)5 |
| CEAC 557 | Conductive Polymers | (3-0)5 |

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|---|---|---|
| CEAC 571 | Membrane Science and Processes | (3-0)5 |
| CEAC 572 | Electromembrane Processes | (3-0)5 |
| CEAC 574 | Optimization of Chemical Reactors | (3-0)5 |
| CEAC 575 | Chemical Kinetics | (3-0)5 |
| CEAC 577 | Petroleum Refinery Engineering | (3-0)5 |
| CEAC 578 | Industrial Plant Investments | (3-0)5 |
| CHE 416 | Basic Biology | (3-0)5 |
| CHE 491 | CO_OP Practice I | (3-0)5 |
| CHE 493 | CO_OP Practice II | (3-0)5 |
| CHE 495 | CO_OP Practice III | (3-0)5 |
| CMPE 468 | Machine Learning for Engineers | (3-0)5 |
| EE 449 | Pattern Classification and Sensor Applications for Engineers | (3-0)5 |
| ENE 303 | Modeling, Analysis and Simulation | (3-1)5 |
| ENE 306 | Nuclear Energy | (3-0)6 |
| ENE 308 | Solar Energy Technology | (3-1)5 |
| ENE 312 | Wind Energy Technologies | (3-1)5 |
| ENE 412 | Fuel Cell Technologies | (3-0)5 |
| ENE 421 | Hydrogen Technology | (3-0)5 |
| ENE 430 | Energy Sytems in Buildings | (3-0)5 |
| IE 314 | Project Management | (3-0)5 |
| IE 322 | Industrial Engineering Practices in Energy Sector | (3-0)5 |
| IE 443 | Occupational Health and Safety | (3-0)5 |
| IE 445 | Technology Management | (3-0)5 |
| IE 446 | Innovative Products Services and Systems | (3-0)5 |
| IE 447 | Technology Entrepreneurship | (3-0)5 |
| ISE 432 | Innovation and Entrepreneurship in IT | (3-0)5 |
| MATE 310 | Polymeric Materials | (3-0)5 |
| MATE 458 | Materials for Catalysis and Fuel Cells | (3-0)5 |
| MATE 460 | Biomaterials | (3-0)5 |
| MATE 462 | Nanomaterials | (3-0)5 |
| MATE 470 | Introduction to Tissue Engineering | (3-0)5 |

| | | |
|---|---|---|
| MATE 474 | Processing of Ceramic Materials | (3-0)5 |
| ME 488 | Production Design and Prototyping | (1-4)5 |
| MECE 322 | Multidisciplinary Design in Engineering | (2-2)5 |
| MECE 422 | Multidisciplinary Engineering Design | (2-2)5 |
| MFGE 405 | Rapid Prototyping | (3-0)5 |
| MFGE 420 | Project Management in Manufacturing | (3-0)5 |
| MFGE 432 | Polymer Processing | (3-0)5 |
| MFGE 481 | Nanofabrication | (3-0)5 |
| MFGE 482 | Introduction to CAD/CAM | (2-1)5 |
| MFGE 484 | Plastic Injection Moulding Technology | (3-1)5 |
| SE 375 | 3D Modeling, Animation and Game Design | (2-2)5 |
| SE 426 | Emerging Technologies | (2-2)5 |
| SE 446 | Introduction to Bioinformatics | (3-0)5 |

## Course Descriptions

AE 307 Fluid Mechanics (3-1)6

Introduction to basic concepts of fluid mechanics; properties of fluids; pressure and fluid statics, fluid kinematics, Bernoulli and energy equations, momentum analysis of flow systems, dimensional analysis and modeling, internal flow, external flow ? drag and lift.

CEAC 311 Fundamentals of Mass Transfer (3-0)5

Principles of molecular mass transfer principles; molecular diffusion coefficient and estimation methods; equimolar countercurrent diffusion and diffusion through stagnant media; chemical engineering applications of these diffusion types (such as distillation and gas absorption); convective mass transfer; concept of mass transfer coefficient and mass transfer rate; interfacial mass transfer; rate-based column design for gas absorption (by ASPEN); gas absorption application for CO2 capture.

CEAC 404 Graduation Project (1-4)5

Student who are at their 7th and 8th semesters, or at their last semester will perform the research work for the Graduation Project; the topics are suggested by the faculty members, and the project is carried out under the supervision of a multidisciplinary faculty team; the students may come up with the multidisciplinary project topic themselves, and seek a team of faculty members for guidance as well.

CEAC 412 Bioinorganic Chemistry (3-0)5

Toxic, essential amd key metals in the living systems.

CEAC 417 Pharmacology and Toxicology (3-0)5

The history of toxicology and pharmacology, basics of toxicology, dose response relationship, dose and route of intake of toxic materials, factors that affect toxic response: tendency, metabolism, metabolism for

toxic response, biological and chemical factors that affect structure, determination of the examples of toxic effects caused by certain ch

CEAC 418 Applied Polymer Science (2-2)5

Primary classification of polymeric materials, synthesis of nylon 6-10 and nylon 6, synthesis of polystyrene, synthesis of pol (methylmetacrylate), synthesis of bakelite: the world?s first synthetic plastic, synthesis of polysulfide rubber, synthesis of linear and crosslinked polyesters, photopolymerization of methyl methacrylate, chemical polymeri

CEAC 419 Transport Phenomena (3-0)5

No data provided

CEAC 420 Nanoscience and Nanotechnology (3-0)5

The state of the art of nanoscience, the rapid progress in experimental techniques and theoretical studies, physical principles, and a number of nanoscale measuring methods on synthesis and characterization of nanosystems, technological application of nanoscience, nanochemistry and nanobiology, nanomedicine.

CEAC 423 Polymer Science and Technology (3-0)5

Historical development, basic concepts and definitions, classifications of polymers, polymerization mechanisms, chain-reaction polymerization, ionic and coordination polymerizations, step-growth polymerizations, ring-opening polymerization, chemical bonding and polymer structure, morphology, crystallinity, glass transition temperature, polymer modi

CEAC 424 Conjugated Polymers I: Design, Synthesis and Characterization (3-0)5

The design, synthesis and characterization of conjugated polymers.

CEAC 431 Plastic Materials (3-0)5

The historical development of plastic materials, the chemical nature of plastics, states of aggregation in polymers, relationship between structure and thermal and mechanical properties, relationship between structure and chemical properties, additives for plastics, principles of product design, principles of the processing of plastics.

CEAC 442 Environmental Pollution (3-0)5

Assessing environmental impact, risk analysis, water pollution, wastewater treatment, air pollution, air pollution control, solid wastes, hazardous wastes.

CEAC 470 Petrochemical Engineering (3-0)5

Introduction to petroleum refining and petrochemical industries, steam cracking and olefins production, emerging technologies for olefin production, catalytic reforming and aromatics (BTX) production, C8 aromatics, aromatics from pyrolysis gasoline and other sources, steam reforming and related processes.

CEAC 474 Electrochemistry (3-0)5

General electrochemical concept, introduction to electrochemistry, thermodynamics, electrode potentials,

galvanic and electrolytic cells, the cell potential of an electrochemical cell, electrode kinetics, reversible reactions, irreversible reactions, dynamic electrochemistry, mass transport, migration, convection, diffusion layers, conductivity and

CEAC 502 Advanced Biochemistry (3-0)5

The basic mechanism in metabolic reactions, regulations of metabolic reactions, importance of metabolic reactions in biological systems.

CEAC 503 Advance Inorganic Chemistry (3-0)5

Bronsted and Lewis acid-base concepts, coordination chemistry, molecular structures, point group reactions, redox reactions.

CEAC 504 Advanced Analytical Chemistry (3-0)5

The analytical process and measurements, statistical treatment of analytical data, acid base equilibria, the solubility of precipitates, gravimetric analysis, volumetric analysis, precipitation titration, complexiметric titration, principles of oxidation reduction reactions, oxidation reduction titration, spectroscopic method of analysis.

CEAC 507 Advanced Chemical Reaction Engineering (3-0)5

Theoretical foundations of reaction rates, collision theory and transition state theory, thermochemistry of species and reactions, estimation of thermochemical and reaction rate parameters using empirical and quantum chemical methods, elementary reactions in the gas phase, elementary reactions on surfaces, diffusion and heterogeneous reactions.

CEAC 509 Advanced Heat and Mass Transfer (3-0)5

Principles and analogies of molecular heat and mass transport, convective heat and mass transport, interfacial heat and mass transfer,basic vectorial equation for mass transfer with chemical reaction, analytical and numerical solution of one dimensional transient transport equations, gas absorption with chemical reaction.

CEAC 529 Spectroscopic Techniques (3-0)5

General introduction to spectroscopy, electronic absorption spectroscopy, vibration and raman spectroscopy, nuclear magnetic resonance spectroscopy, electron paramagnetic resonance spectroscopy, mass spectroscopy, x-ray crystallography, SEM and TEM.

CEAC 533 Mathematical Modeling in Chemical Engineering (3-0)5

Modeling concepts and terminology in chemical engineering problems, molecular and convective transport for heat, mass and momentum, interphase transport and transport coefficients in model development, steady and unsteady state microscopic and macroscopic transport

CEAC 554 Electrochemical Methods: Fundamentals and Applications (3-0)5

General electrochemical concepts, electroanalysis, introduction to electrochemistry, equilibrium measurements, potentiometry, voltammetry, coulometry, chronometry, polarography, rotating electrodes, rate constants of electron transfer, spectroelectrochemistry, electrochemical ESR spectrometry, impedance, electrode preparation methods, cleaning

CEAC 557 Conductive Polymers (3-0)5

Discovery and development of conductive polymers, polymerization techniques, chemical polymerization, electropolymerization, classes of conducting polymers, polyacetylenes, polyanilines, polypyrroles, polythiophenes, polycarbazoles, polyfluorenes, etc. and their derivatives, structure?property relationships, insulator?metal transition, metallic sta

CEAC 571 Membrane Science and Processes (3-0)5

Basic concepts and definitions in membrane science, membrane materials, characterization, transport theory, fouling and concentration polarization, membrane separations, ion exchange membrane processes, energy generating processes and fuel cells.

CEAC 572 Electromembrane Processes (3-0)5

Basic concepts and definitions in ion exchange membrane science, materials, characterization, electrochemical and thermodynamic fundamentals, energy conversion technologies, fuel cells, process and equipment design.

CEAC 574 Optimization of Chemical Reactors (3-0)5

Obtaining the objective function. Determination of optimization parameters. Optimization of series, parallel and complex reactions. Optimum temperature progress. Endothermic and exothermic reactions. Economics considerations in optimum reactor design.

CEAC 575 Chemical Kinetics (3-0)5

After an initial treatment of the basic phenomenological view of kinetics, we will cover classical analyses of reaction mechanisms (steady-state approximation, pre-equilibria, etc), transition-state theory, and various experimental methods of determining reaction rates and mechanisms.

CEAC 577 Petroleum Refinery Engineering (3-0)5

Introduction to petroleum refining and petrochemical industries, steam cracking and olefins production, emerging technologies for olefin production (such as methanol to olefins (mto), partial oxidation, dehydrogenation, metathesis), catalytic reforming and aromatics (btx) production, c8 aromatics, aromatics from pyrolysis gasoline and other sources

CEAC 578 Industrial Plant Investments (3-0)5

Development of investment project idea, revealing project justification and investability, relative levels of conceptual, basic and detailed design, roles of different engineering majors in plant design, conducting project feasibility, regulatory processes and permitting, project management, planning (schedule, cost, performance, risks), financing,

CHE 101 Introduction to Chemical Engineering (2-0)2

A general introduction to engineering and chemical engineering, the role of chemical processing, strategies for solving engineering problems, important process variables, fundamentals of material balances.

CHE 103 General Chemistry (3-2)5

General basic chemistry concepts, stoichiometric calculations based on the mole concept, solid, liquid and gas phases, periodic table and properties, prediction of molecular geometry, properties of gases, solutions.

CHE 104 General Chemistry (3-2)4.5

Kinetic theory, chemical equilibrium, basic concepts of acids and bases, pH calculations, additional aspects of acid and bases (common ion effect, buffer solutions, neutralization reactions, solubility and Ksp calculations etc.), thermochemistry, laws of
thermodynamics, electrochemistry and nuclear chemistry.

CHE 201 Analytical Chemistry (3-2)6

Introduction, calculations, types of errors, statistics, gravimetric and titrimetric methods, equilibrium calculations, titrations, evaluation of titration curves, aqueous solution chemistry, related laboratory program.

CHE 202 Organic Chemistry (3-2)6

Basic concepts and definitions, bonds in organic compounds, stereochemistry, classification of organic compounds, addition and elimination reactions, alcohols, ethers, aromatics, amines, carboxylic acids, carbohydrates and oils, amino acids and proteins, simple organic conversion designs.

CHE 203 Physical Chemistry (3-2)5

The properties of gases,the perfect gases,the real gases,the first law,thermochemistry,state functions and exact differentials,the second law,the direction of spontaneous change,concentrating on the system,combining the first and second laws,physical transformations of pure substances,phase diagrams,phase stability and phase transitions,simple mixtures,the thermodynamic description of mixtures,the properties of solutions,activities,phase diagrams,phases,components, and degrees of freedom

CHE 208 Chemical Process Calculations (3-2)6

An introduction to chemical engineering calculations, chemical engineering processes and process variables, fundamentals of material balances, material balances on single and multiple-unit processes, single-phase systems, fundamentals of energy balances, forms of energy, energy balances on closed and open systems at steady-state, mechanical energy.

CHE 210 Inorganic Chemistry (3-0)5

Bronsted and Lewis acid-base concepts, coordination chemistry, molecular structures, point group and redox reactions.

CHE 302 Separation Processes (3-2)6

Mass transfer operations; binary distillation, liquid-liquid extraction, multicomponent separations, absorption, membrane separations, fluid-solid separations, adsorption.

CHE 303 Chemical Reaction Engineering I (3-0)5

Introduction to reaction engineering, basic definitions: reaction rate, elementary and non-elementary reactions, molecularity, order, chemical equilibrium, reversible and irreversible reactions, reaction stoichiometry, collection and analysis of chemical reactor data: batch reactor data, differential reactors, mass balances for ideal chemical reactors: batch, continuous stirred tank, plug flow and fixed bed reactors, multiple reactions in series or in parallel, pressure drop in reactors.

CHE 304 Chemical Reaction Engineering II (3-2)6

Catalysis and catalytic reactors, non-isothermal reactor design, adiabatic and non-adiabatic operations, reactor design with diffusion effects, non-elementary reactions, multiple reactions, multiphase reactors, distributions of residence times for chemical reactors.

CHE 311 Fundamentals of Mass Transfer (3-0)5

Principles of molecular mass transfer principles,molecular diffusion coefficient and estimation methods,equimolar countercurrent diffusion and diffusion through stagnant media,chemical engineering applications of these diffusion types (such as distillation and gas absorption),convective mass transfer,concept of mass transfer coefficient and mass transfer rate,interfacial mass transfer,rate-based column design for gas absorption (by ASPEN),gas absorption application for carbon dioxide capture

CHE 312 Biochemistry (3-0)5

Foundations of biochemistry, water and its properties, carbohydrates and their roles, amino acids and proteins, nomenclature, characterization function and mechanism of enzymes, vitamins and coenzymes, nucleic acids and their components, lipids, introduction to metabolism, carbohydrates, glycolysis, the citric acid cycle, lipid metabolism, electron transport chain and oxidative phosphorylation.

CHE 399 Summer Practice I (0-0)6

Observation of the analytical and the physical chemistry techniques used in the laboratories of the company, a summer practice report.

CHE 401 Chemical Engineering Laboratory I (0-4)6

Several experiments on fluid mechanics, heat exchanger, heat transfer, heat conduction, distillation and extraction.

CHE 402 Chemical Engineering Laboratory II (0-4)6

Several experiments on fluid mechanics and unit operation, and reactor design.

CHE 405 Chemical Engineering Design I (3-2)7

Problem solving strategies, flowsheets, hierarchical approach to process design, batch operations, understanding process conditions, design heuristics, pump and compressor performance, heat exchanger design and performance, separator design and performance, reactor design and performance.

CHE 406 Chemical Engineering Design II (1-4)7

Process design, process economy, health, safety, environmental considerations.

CHE 407 Process Modeling, Dynamics and Control (3-1)6

Mathematical models of chemical engineering systems (fundamentals and examples of mathematical models), time-domain dynamics, conventional control systems and hardware, advanced control systems, Laplace domain dynamics, Laplace domain analysis of conventional feedback control systems and frequency-domain dynamics.

CHE 416 Basic Biology (3-0)5

Chemistry of life, elements, atoms, compounds, molecules, pH scales, biomolecules; carbohydrates, proteins, lipids, nucleic acids, cell structure and functions, cell membrane structure and function, cellular organelles structure and functions, human organization; blood and circulation system, respiratory system, digestive system, nervous system, chromosomes and chromosomal inheritance, genetics, DNA and

biotechnology.

CHE 491 CO_OP Practice I (3-0)5

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CHE 493 CO_OP Practice II (3-0)5

xxx

CHE 495 CO_OP Practice III (3-0)5

xxxx

CHE 499 Summer Practice II (0-0)6

Observation of the analytical and the physical chemistry techniques used in the laboratories of the company, a summer practice report.

CMPE 102 Computer Programming (2-2)4

The objective of this course is to provide the basics of programming concepts using Python programming language and enable students to gain experience in laboratory environment.

CMPE 468 Machine Learning for Engineers (3-0)5

Artificial intelligence, machine learning, supervised and unsupervised learning, binary classification, multiclass classification, regression, clustering, model evaluation.

EE 449 Pattern Classification and Sensor Applications for Engineers (3-0)5

Sensors, general information about sensor types and sensor working principles; what is a pattern; pattern classification applications; theory and methods of pattern classification; feature extraction and selection; MATLAB Classification Learner Tool; analysis and performance of classifiers; RFID basics.

ENE 203 Thermodynamics I (3-0)6

Basic concepts and definitions, properties of a pure substance, equations of state, work and heat interactions, first law of thermodynamics, internal energy and enthalpy, second law of thermodynamics, entropy, reversible and irreversible processes, thermodynamic analysis of processes, third law of thermodynamics.

ENE 301 Heat Transfer (3-1)6

Basic concepts of heat transfer; mechanisms of heat transfer (conduction, convection, radiation).

ENE 303 Modeling, Analysis and Simulation (3-1)5

Translational mechanical systems, state-variable equations, inputoutput equations, matrix formulation, block diagrams and computer simulation, rotational mechanical systems, electrical systems, Laplace transform solutions of linear models.

ENE 306 Nuclear Energy (3-0)6

Atomic energy, radioactivity, nuclear processes, neutron-atom interactions, nuclear fission and fusion reactions, basic principles of neutron diffusion theory, nuclear energy systems, nuclear heat energy and applications, nuclear power plants.

ENE 308 Solar Energy Technology (3-1)5

Introduction to solar energy conversions, fundamentals of solar radiation, methods of solar collection and thermal conversion, solar heating systems, solar thermal power, capturing solar energy through biomass.

ENE 312 Wind Energy Technologies (3-1)5

Wind characteristics, wind energy, wind turbines, design of wind turbines, projecting, planning and economy, wave energy and wave energy conversion systems.

ENE 412 Fuel Cell Technologies (3-0)5

Introduction: fuel cell operating principles,history,types,components and systems;fuel cell thermodynamics and electrochemistry:Nernst equation,Tafel equation,cell voltage,fuel cell efficiency and losses for operational fuel cell voltages;proton exchange membrane fuel cells:components and system, construction and performance, critical issues and recent developments;fuel cell stack design and calculations; hydrogen production, storage, safety and infrastructure; balance of fuel cell power plant

ENE 421 Hydrogen Technology (3-0)5

Properties of hydrogen, production of hydrogen from fossil fuels and biomass, hydrogen as fuel, electrolysis, hydrogen storage, applications.

ENE 430 Energy Sytems in Buildings (3-0)5

Building structure, heating, ventilation and air conditioning, the calculation of heat loss and insulation surfaces, water, fuel and electricity consumption in buildings, the national andinternational standards and regulations on energy efficiency in buildings.

ENG 101 English For Academic Purposes I (4-0)3.5

English language skills, especially academic skills, such as reading comprehension, vocabulary building and critical analysis of texts; listening and note-taking, class discussions, presentations, writing, research assignments and use of technology.

ENG 102 English for Academic Purposes II (4-0)3.5

Academic skills such as reading comprehension, class discussions, use of academic vocabulary and critical analysis of texts; research assignments and review of the English language structure; skills such as listening and note-taking, analysis of written products, writing, presentation and use of technology.

ENG 201 English for Academic Purposes III (3-0)3

Advanced reading and writing skills, applying critical reading skills and strategies, identifying the organization of a reading text, main ideas of the texts, and the author?s main purpose, summarizing a given text, outlining and writing an argumentative essay.

ENG 202 English for Academic Purposes IV (3-0)3

Preparing and writing research reports and delivering effective oral/written informative and persuasive presentations; gathering information, organizing data, outlining, using appropriate techniques in presentation and delivering for a maximum impact, using visual aids and citation effectively.

ENG 301 English for Occupational Purposes I (3-0)3

Job-related communication skills;the functions such as describing relationships at work,discussing performance reviews and giving feedback,discussing plans and arrangements,using social media for professional communication,discussing on recruitment tests and job interviews,presenting a service or product,writing reviews on websites

ENG 302 English for Occupational Purposes II (3-0)3

More detailed job-related communication skills;describing and organising meetings,developing communicational styles in various cultural settings,handling mistakes and apologizing,getting familiar with marketing styles and advertising,deciding how to adapt and market a product in different countries,

HIST 101 Principles of Atatürk and History of Turkish Revolution I (2-0)2

French Revolution; structure and geopolitic positioning of Ottoman Empire, reasons of its decline; Westernization movements, First and Second Constitutional Monarchy declarations; Libya and Balkan wars; First World War; period before the War of Independence, congresses, National Pact, establishment of Turkish Grand National Assembly.

HIST 102 Principles of Atatürk and History of Turkish Revolution II (2-0)2

War of Independence; Lausanne Treaty; declaration of the Republic; removal of sultanic rule and caliphate; Atatürk`s revolutions; establishment of national economy; Second World War, before and after; Turkish Republic after 1960.

HIST 221 History of Civilization (3-0)3

A chronological order of the rise of civilizations from Sumer until the Scientific Revolution.

IE 314 Project Management (3-0)5

Elements and phases of project management; functions (planning, staffing, scheduling, monitoring, and control) and techniques (CPM, PERT, etc.) of project management; software tools for project management; project cost control and time/resource management; leadership styles, conflict and risk management.

IE 322 Industrial Engineering Practices in Energy Sector (3-0)5

The impact of energy in today?s world; principles of energy planning and utilization; the drives of energy supply and demand; the role of an engineer in energy industries for management, resource planning and utilization; sustainability as a driving force for energy planning; common concepts in energy management; a paradigm of decision making: conventional versus new energy resources including nuclear and renewable energy; economical evaluation of energy investments,

IE 443 Occupational Health and Safety (3-0)5

Basic information on occupational health and safety, principles and legislations, occupational health and safety requirements to be applied in the workplace, occupational accidents, risk assessment and occupational audits; a proactive approach to occupational health and safety.

IE 445 Technology Management (3-0)5

The topics covered
a) identifying the strategic issues in technology management (TM);
b) identifying the issues in organizing TM functions and related human element ;
c) identifying the issues in TM-Activities and Tools
d) being able to identify, formulate and solve TM problems.

IE 446 Innovative Products Services and Systems (3-0)5

Innovation, innovative products, services and systems; innovative organizations, products, services and systems or any topic involving design, development and innovation.

IE 447 Technology Entrepreneurship (3-0)5

Technology Entrepreneurship course aims to enable students to learn variety of basic areas and concepts of entrepreneurship including idea generation, business plan creation, venture financing sources, marketing and go to market strategies and to apply the concepts learned through real life cases and a term project.

ISE 432 Innovation and Entrepreneurship in IT (3-0)5

Introduction to entrepreneurship, recognizing opportunities and generating ideas, feasibility analysis, developing an effective business model, industry and competitor analysis, writing a business plan, preparing the proper ethical and legal foundation, assessing a new venture?s financial strength and viability, building a new-venture team, working with disciplinary teams, working with interdisciplinary teams, getting financing or funding.

KRY 111 Career Planning (1-0)1

Being a student at Atilim University, Student-centered programs at Atilim University, Faculty, Department presentations, Career Planning and Coop Program, Erasmus, CV writing types, Interview techniques, Effective Communication and presentation techniques, Intelligence and Personality

MATE 310 Polymeric Materials (3-0)5

Introductory information about the types, importance and application of polymeric materials; structure and properties of polymers; characteristics, applications, and processing of polymers.

MATE 458 Materials for Catalysis and Fuel Cells (3-0)5

Fundamentals of catalysis and catalytic reactors; catalyst synthesis methods; properties of catalytic materials and basics characterization methods; catalyst structure activity relationship fundamentals of electro-catalysis, photo catalysis, different types of fuel cells, and materials used for these applications; existing technology applications; future trends and emerging technologies

MATE 460 Biomaterials (3-0)5

Definition of biomaterial,biocompatibility,host response,synthetic and biological materials,synthetic biomaterial classes,polymers in the body,implant factors,host factors,categories of biomaterial applications,evaluation of biomaterials,historical evaluation of implants,current work in biomaterials, motivation for future directions,current trends.Properties of materials;bulk properties of materials,

mechanical properties of materials;comparison of common surface analysis methods;

MATE 462 Nanomaterials (3-0)5

Nanotechnology fundamentals, history, applications and novel materials; synthesis and application of nanomaterials and their application in industry in relation to existing technology applications; future trends and emerging technologies.

MATE 470 Introduction to Tissue Engineering (3-0)5

Introduction and the important terminology and concepts of tissue engineering, cells for tissue engineering, biomaterials for tissue engineering, tissue fabrication technology, vascularization of artificial tissue, bioreactors for tissue engineering.

MATE 474 Processing of Ceramic Materials (3-0)5

Powder preparation, preconsolidation, shape-forming process, synthesis, theory of sintering, modified densification processes, final machining, effect of grinding on microstructure of ceramics, glass manufacturing process.

MATH 151 Calculus I (4-2)7

Preliminaries, limits and continuity, differentiation, applications of derivatives, L`Hopital's Rule, integration, applications of integrals, integrals and transcendental functions, integration techniques and improper integrals, squences.

MATH 152 Calculus II (4-2)7

Infinite series, vectors in the plane and polar coordinates, vectors and motions in space, multivariable functions and their derivatives, multiple integrals: double integrals, areas, double integrals in polar coordinates, triple integrals in rectangular, cylindrical and spherical coordinates, line integrals, Independence of path,Green's theorem.

MATH 275 Linear Algebra (4-0)6

Linear equations and matrices, real vector spaces, inner product spaces, linear transformations and matrices, determinants, eigenvalues and eigenvectors.

MATH 276 Differential Equations (4-0)6

First-order, higher-order linear ordinary differential equations, series solutions of differential equations, Laplace transforms, linear systems of ordinary differential equations, Fourier analysis and partial differential equations.

MATH 380 Numerical Methods for Engineers (3-1)5

Solution of nonlinear equations, solution of linear systems, eigenvalues and eigenvectors, interpolation and polynomial approximation, least square approximation, numerical differentiation, numerical integration.

ME 108 Computer Aided Solid Modeling (1-3)4.5

Part design and principles of surface design, drafting of part design, fundamental concepts of dimensioning and tolerances, fundamentals of assembly design and bill of materials.

ME 488 Production Design and Prototyping (1-4)5

Introduction to basic mechanical concepts,mechanical behavior of basic structural elements;introduction to basic materials science and basic manufacturing methods,introduction to mechanical and physical properties of materials;introduction to basic manufacturing processes and casting and material forming; basic design factors(line,figure,color,material,texture,design field,form,value in lighting), ergonomics/anthropometry;meaning in design;design project development by drawing and prototyping.

MECE 322 Multidisciplinary Design in Engineering (2-2)5

An overview of systems engineering (V-Model); engineering design process and methodology; needs assessment; project planning; literature review and patent survey; design criteria and constraints; creativity and idea generation; decision making for idea selection; methods and tools of functional decomposition; product/system architecture; modelling and simulation

MECE 422 Multidisciplinary Engineering Design (2-2)5

Design process and methodology; identification of engineering disciplines, features and importance of multidisciplinary engineering design; systems engineering; need identification and assessment, problem definition; creativity and idea generation; methods and tools of functional/physical/task decomposition; design representation techniques, conceptual modeling of energy, information and material flow in technical systems; idea selection, decision schemes; product architecture

MFGE 405 Rapid Prototyping (3-0)5

Rapid prototyping technologies, CAD models suitable for automated fabrication, secondary processing, additive manufacturing technologies, stereolithography, fused deposition modeling, laminated object manufacturing, selective laser sintering, direct metal laser sintering, casting processes for rapid prototyping, investment casting, rapid tooling, reverse engineering.

MFGE 420 Project Management in Manufacturing (3-0)5

Project management standards;project,portfolio,program and operation management concepts; managing participation,teamwork, and conflict;need identification and assessment,problem definition; creativity and idea generation;methods and tools of functional/physical/task decomposition;mind mapping;planning methods; cost estimation and budgeting;time management and scheduling;project quality management;resource allocation; project risk management techniques; project execution, monitoringtechniques

MFGE 432 Polymer Processing (3-0)5

Introduction to hydrocarbons and macromolecular structures, homopolymers, copolymers, elastomers, blends and thermosets, morphology of polymers, semicrystalline and amorhous states, polymer additives, mechanical properties, differential scanning calorimetry and dilatometry, rheological properties, non Newtonian flow, viscoelasticity, melt flow index and rheometers, melting and mixing; die forming, extrusion based processes, molding processes, manufacture of tires and other rubber products.

MFGE 481 Nanofabrication (3-0)5

Fabrication of metallic nanomaterials, manufacturing of carbon based nanostructures, nanostructured systems from low-dimensional building blocks, characterization techniques and manufacturing methods, proximity effect.

MFGE 482 Introduction to CAD/CAM (2-1)5

Introduction to CAD,overview of geometric modeling techniques (wireframes, boundary representation, constructive solid geometry and hybrid modelers), parametric and variation modeling, parametric modeling of curves and surfaces (Bezier, B-spline and NURBS), introduction to CAM, CNC part

programming,machining strategies, cutting tool selection, tool path generation, post-processing.

MFGE 484 Plastic Injection Moulding Technology (3-1)5

Main properties of plastics, design of injection moulds, types of injection moulds, injection moulding process; filling packing, and cooling stages, computer aided analysis of injection moulding process, introducing, using, and evaluating of a simulation software, and its analysis results, different types of injection moulds, new developed processes of injection moulding.

PHYS 101 General Physics I (3-2)6

Measurement, motion along a straight line, vectors, motion in two and three dimensions, force and motion I, force and motion II, kinetic energy and work, potential energy and conservation of energy, center of mass and linear momentum, rotation, rolling, torque, and angular momentum, equilibrium and elasticity.

PHYS 102 General Physics II (3-2)6

Electric charge, electric fields, Gauss` law, electric potential, capacitance, current and resistance, circuits, magnetic fields, magnetic fields due to currents, induction and inductance.

SE 375 3D Modeling, Animation and Game Design (2-2)5

Introduction to modeling bases, an overview of the design of the model, selection of the appropriate modeling technique; transforming the model into simulation and animation; overview of simulation and physics engine; control of model and animation with peripherals; overview of peripherals; interactive project construction with the selection of appropriate peripherals; 3D modeling for 3D printers; artificial organ design with 3D printers; industrial product design with 3D printers;

SE 426 Emerging Technologies (2-2)5

What is an "Emerging Technology", disruptive technologies; identification of disruptive technologies; the 3D printing revolution; the evolution of technology; the nature o innovation; combination and structure; phenomena, domains and problem-solving; origin of technologies; technological revolution; economic revolution; forecasting.

SE 446 Introduction to Bioinformatics (3-0)5

DNA and protein sequence alignment, phylogenetic trees, protein structure prediction, motive findin, microarray data analysis, gene/protein networks.

TURK 401 Turkish Language I (2-0)2

Languages and their classification; history of Turkish language, its spread over the world and its place among other languages; Turkish language in the republic era; orthography; expressions; foreign words, suffixes and prefixes; punctuation; language and verbalism.

TURK 402 Turkish Language II (2-0)2

Written expression and its genres; bibliography; sentence structure and types; misexpression; verbal expressions.