

Curriculum		T	P	ECTS
1 st Semester				
ATU111	Orientation	1	0	1
KRY101	Career Planning	1	0	1
ME108	Computer Aided Solid Modeling	1	3	4,5
HIST221	History of Civilization	3	0	3
PHYS101	General Physics I	3	2	6
MATH151	Calculus I	4	2	7
CMPE102	Computer Programming	2	2	4
ENG101	English For Academic Purposes I	4	0	3,5
TURK201	Turkish I	3	0	3
2 nd Semester				
TURK202	Turkish II	3	0	3
PHYS102	General Physics II	3	2	6
ENE102	Fundamentals of Energy Systems Engineering	1	0	1,5
CHE105	General Chemistry	3	2	5
ENG102	English for Academic Purposes II	4	0	3,5
MATE207	Introduction to Materials Engineering	3	0	5
MATH152	Calculus II	4	2	7
3 rd Semester				
MATH275	Linear Algebra	4	0	6
ENE201	Energy Systems I	3	2	9
ME211	Statics and Strength of Materials	3	1	6
ENG201	English for Academic Purposes III	3	0	3
ENE203	Thermodynamics I	3	0	6
4 th Semester				
ENE202	Energy Systems II	3	2	5
ENE204	Thermodynamics II	3	0	5
ENG202	English for Academic Purposes IV	3	0	3
MECE204	Dynamics	2	2	6
MATH276	Differential Equations	4	0	6
EE234	Introduction to Electrical Engineering	3	1	5

5 th Semester				
	Area Elective (1)	3	0	5
IE220	Probability and Statistics	3	0	5
ENE303	Modeling, Analysis and Simulation	3	1	5
AE307	Fluid Mechanics	3	1	6
FE302	Principles of Engineering Profession	3	0	3
ENE302	Heat and Mass Transfer	3	1	6
ENE399	Summer Practice I	0	0	10
6 th Semester				
EE352	Electromechanical Energy Conversion	3	2	6
FE301	Occupational Health and Safety	3	0	4
ENE306	Nuclear Energy	3	0	6
	Area Elective (4)	3	0	5
MECE306	Control Systems I	3	0	6
	General Elective	3	0	4
7 th Semester				
	Area Elective (3)	3	0	5
ENE499	Summer Practice II	0	0	10
HIST111	Principles of Atatürk and History of Turkish Revolution I (in English)	2	0	2
	General Elective	3	0	4
	Area Elective (5)	3	0	5
ENE401	Energy Systems Design Project I	2	2	9
IE305	Engineering Economy	2	0	5
8 th Semester				
	Area Elective (2)	3	0	5
ENE402	Energy Systems Design Project II	2	2	8
ENE406	Energy Management	3	0	6
HIST112	Principles of Atatürk and History of Turkish Revolution II (in English)	2	0	2
	Area Elective (6)	3	0	5
	General Elective	3	0	4

(1) ENE312TE, ENE308, ENE412TE, ENE415, AET305, E400, ENE310, ENE316, ENE409, ENE411, ENE413, EE451, EE452, ENE410, ENE412, ENE414, ENE416, ENE418, ENE420, ENE422, ENE424, ENE426, ENE428, ENE430, ENE314, ENE421, ENE305, ENE403, MECE422, ENE304, ENE312, ENE493, ENE491, ENE404, EE454, AE434, ENE408,

(2) AET355, ME408, ENE415, E400, ENE310, ENE316, ENE409, ENE411, ENE413, EE451, EE452, ENE410, ENE414, ENE416, ENE418, ENE420, ENE422, ENE424, ENE426, ENE428, ENE430, ENE314, ENE412, ENE421, ENE312, ENE403, ENE305, MECE422, ENE304, ENE493, ENE491, ENE404, EE454, AE434, ENE408,

(3) ENE312TE, ENE308, ENE412TE, ENE415, AET325, E400, ENE310, ENE316, ENE409, ENE411, ENE413, EE451, EE452, ENE410, ENE412, ENE414, ENE416, ENE418, ENE420, ENE422, ENE424, ENE426, ENE428, ENE430, ENE314, ENE421, ENE305, ENE403, MECE422, ENE304, ENE493, ENE491, ENE404, EE454, AE434, ENE408,

(4) ENE308, ENE312TE, AET315, E400, EE451, EE452, ENE310, ENE316, ENE409, ENE411, ENE413, ENE410, ENE412, ENE414, ENE416, ENE418, ENE420, ENE422, ENE424, ENE426, ENE430, ENE314, ENE428, ENE421, MECE422, ENE403, ENE305, ENE304, ENE493, ENE491, ENE404, EE454, AE434, ENE408,

(5) AET335, ENE312TE, ENE308, ENE412TE, ENE415, E400, ENE310, ENE316, ENE409, ENE411, ENE413, EE451, EE452, ENE410, ENE412, ENE414, ENE416, ENE418, ENE420, ENE422, ENE424, ENE426, ENE428, ENE430, ENE314, ENE421, ENE305, ENE403, ENE304, ENE491, ENE493, ENE404, EE454, AE434, ENE408,

(6) ME488, ENE430, IE314, ISE432, MFGE405, SE426, ENE312, MATE460, IE443, ENE308, IE322, MATE462, MECE422, MFGE420, SE375, CMPE468, SE446, MATE458, IE446, EE449, AET345, IE447, IE445, MECE322,

General Electives

ENG395, KOR201, GET314, 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, ART202, CHIN201, PR492, MAN415, ART235, ART293, ART294, CHIN202, CHIN301, PR491, MAN428, MAN409, LAW250, CHIN302, ART284, ECON442, HUM212, ENE495, SPAN402, RUS402, ART287, ENE497, ART285, ART286, RUS401, SPAN401, ART288, ART297, ART289, HUM331, MAN374, KOR202, ART295, HUM291, ART261, ART298, HUM310, ECON318, ART266, KOR301, ART262, ART267, ART226, ART264, HUM202, ART227, MAN408, MAN313, HUM322, HUM323, HUM105, HUM412, ART228, PR419, HUM319, GET304, GSM147, PR413, ART270, ART265, MAN437, ART268, MAN414, GET324, MAN328, MAN412, ART269,

Area Elective Course List

AE 434	Electric and Hybrid Vehicles	(3-1)5
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
CMPE 468	Machine Learning for Engineers	(3-0)5
E 400	Undergraduate Research Project	(3-0)5

EE 449	Pattern Classification and Sensor Applications for Engineers	(3-0)5
EE 451	Power System Analysis	(3-0)5
EE 452	High-Voltage Techniques	(3-0)5
EE 454	Power Electronics	(3-2)5
ENE 304	Measurement and Instrumentation	(3-0)5
ENE 305	Combustion	(3-0)5
ENE 308	Solar Energy Technology	(3-1)5
ENE 310	Hydropower	(3-0)5
ENE 312	Wind Energy Technologies	(3-1)5
ENE 312TE	Wind Energy Technologies	(3-0)2
ENE 314	Geothermal Energy Technologies	(3-0)5
ENE 316	Reactor Design	(3-0)5
ENE 403	Power Transmission and Distribution	(3-0)5
ENE 404	Energy and Environment	(3-0)5
ENE 408	Modeling and Control of Engineering Systems	(3-1)5
ENE 409	Fossil Energy Resources (Oil, Gas and Coal) I	(3-0)5
ENE 410	Fossil Energy Resources (Oil, Gas and Coal) II	(3-0)5
ENE 411	Electrochemistry	(3-0)5
ENE 412	Fuel Cell Technologies	(3-0)5
ENE 412TE	Fuel Cell Technologies	(3-0)0
ENE 413	Global Finance	(3-0)5
ENE 414	Global Energy	(3-0)5
ENE 415	Energy Storage Technology	(3-0)5
ENE 416	Gas Hydrates	(3-0)5
ENE 418	Energy Laws and Regulations	(3-0)5
ENE 420	Bioenergy Technologies	(3-0)5
ENE 421	Hydrogen Technology	(3-0)5
ENE 422	Optimization in Energy Systems	(3-0)5
ENE 424	Energy and Environment Economics	(3-0)5
ENE 426	Nuclear Technology	(3-0)5
ENE 428	Power Plant Engineering	(3-0)5

ENE 430	Energy Systems in Buildings	(3-0)5
ENE 491	CO_OP Practice I	(3-0)5
ENE 493	CO_OP Practice II	(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 458	Materials for Catalysis and Fuel Cells	(3-0)5
MATE 460	Biomaterials	(3-0)5
MATE 462	Nanomaterials	(3-0)5
ME 408	Thermal Systems Design	(3-0)6
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
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
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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.

AE 434	Electric and Hybrid Vehicles	(3-1)5
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Electric vehicle components; history of electric vehicles; types of electric vehicles; batteries and battery modeling; alternative energy sources and stores (photovoltaics, flywheels, capacitors, fuel cells); DC and AC electric motors, brushed DC motors, and brushless electric motors; power electronics and motor drives; electric vehicle drivetrain.

ENE 399 Summer Practice I (0-0)10

A minimum of thirty working days summer practice especially in the energy related sectors such as power stations, energy producing centers or producers of energy related machines or apparatus such as wind turbine, solar energy panels etc. and energy research centers.

ENE 401 Energy Systems Design Project I (2-2)9

A team work on research, project and design on the energy related subjects and applications.

ENE 402 Energy Systems Design Project II (2-2)8

A team work on research, project and design on the energy related subjects and applications.

ENE 403 Power Transmission and Distribution (3-0)5

Basics of electric power system theory, electric power transmission, electric power transmission model, distribution systems and planning, lightning protection, grounding and safety, distributed generation.

ENE 404 Energy and Environment (3-0)5

Energy resources, processes, environmental effects, air pollution, sustainability, global warming, climate change.

ENE 406 Energy Management (3-0)6

Definition, energy audit-need, types of energy audit, energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments.

ENE 408 Modeling and Control of Engineering Systems (3-1)5

Laplace transform function analysis; linearization; electromechanical systems; thermal systems; fluid systems; block diagrams and computer simulation; modeling, analysis, and design tools; feedback design

ENE 409 Fossil Energy Resources (Oil, Gas and Coal) I (3-0)5

Introduction to fossil energy, global sources of oil and natural gas, petroleum and oil sands, exploration and production, petroleum refining and environmental control and environmental effects, oil shale processing, chemistry and technology, developments in internal combustion engines, gas hydrates, ethics.

ENE 410 Fossil Energy Resources (Oil, Gas and Coal) II (3-0)5

Definition of coal and coal properties, role of coal properties on consumption, utilization of Turkish hard coal, lignite and wastes, coal to liquids, mining, CO₂ reduction, natural gas, ethics.

ENE 411 Electrochemistry (3-0)5

General electrochemical concepts; 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 an

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 412TE Fuel Cell Technologies (3-0)0

Yakıt hücrelerinin elektrokimyası ve termodinamiği, katı oksit hücreler, asit ve alkalın hücreler, biyoyakıt hücreler ve enerji uygulamalarındaki kullanımı.

ENE 413 Global Finance (3-0)5

Financial and global importance of energy services and markets, benefits and barriers to liberalizing energy, integrated energy service companies, corporate financing and capital structure issues.

ENE 414 Global Energy (3-0)5

Effective energy management, energy auditing, economic analysis, business environment for energy industry, technological change in business.

ENE 415 Energy Storage Technology (3-0)5

Basic concepts and definitions, energy storage systems and types, chemical energy storage, batteries and battery types, thermal energy storage methods, thermal energy storage and solar energy, sensible thermal energy storage, latent thermal energy storage, phase change materials, stratification in sensible heat storage systems, modeling of latent h

ENE 416 Gas Hydrates (3-0)5

Hydrate types and formers; hand calculation methods; computer methods; inhibiting hydration formation with chemicals; dehydration of natural gas; combatting hydrates using heat and pressure; physical properties of hydrates, phase diagrams; water content of natural gas, the most complete guide available on natural gas hydrates.

ENE 418 Energy Laws and Regulations (3-0)5

An introduction to energy law and regulation in Turkey, energy market, nuclear safety regulations, renewable energy regulations and distributed generation, environmental impact assessment regulation, smart grid.

ENE 420 Bioenergy Technologies (3-0)5

Biomass as an energy source, photosynthesis of biomass, its conversion related properties, physical conversion processes, thermal conversion, synthetic oxygenated liquid fuels.

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 422 Optimization in Energy Systems (3-0)5

Fundamentals of optimization, graphical optimization, linear and nonlinear programming, unconstrained and constrained optimization, global optimization, MATLAB applications, case studies in energy systems engineering.

ENE 424 Energy and Environment Economics (3-0)5

Energy market; mechanisms, analysis, trading, costs, pricing, emissions, transmission and distribution.

ENE 426 Nuclear Technology (3-0)5

Nuclear materials, nuclear power plants and their types, nuclear processes, nuclear fusion reactions, nuclear energy systems, nuclear protection and shielding, enrichment.

ENE 428 Power Plant Engineering (3-0)5

Analysis and design of steam supply systems, electrical generating systems, and auxiliary systems; nuclear, fossil, hydraulic and renewable energy sources, power plant efficiency and operation.

ENE 430 Energy Systems 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 and international standards and regulations on energy efficiency in buildings.

ENE 491 CO_OP Practice I (3-0)5

Understanding energy efficiency and management technologies, the energy quality and importance of electricity, monitoring and measuring methods and energy saving.

ENE 493 CO_OP Practice II (3-0)5

Renewable energy sources and alternative systems, theoretical knowledge about energy management, economics and policy in these systems, applications

ENE 499 Summer Practice II (0-0)10

A minimum of thirty working days summer practice especially in the energy related sectors such as power stations, energy producing centers or producers of energy related machine or apparatus such as wind turbine, solar energy panels etc. and energy research centers.

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.

presentations, Career Planning and Coop Program, Erasmus, CV writing types, Interview techniques, Effective Communication and presentation techniques, Intelligence and Personality.

MATE 207 Introduction to Materials Engineering (3-0)5

Historical perspective and classification of materials; atomic structure and theory; bonding in solids; the structure of crystalline solids; fundamental mechanical properties of materials; phase diagrams; thermal processing of metal alloys; properties and use of ceramics, glasses and composites; material selection; design and economical considerations

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 basic 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.

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, sequences.

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.

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 211 Statics and Strength of Materials (3-1)6

Statics and mechanics of materials; a review of vector algebra and force vectors; static equilibrium of particles; equivalent systems of forces; equilibrium of rigid bodies; distributed forces; centroid, center of gravity and moment of inertia; stress and strain; mechanical properties of materials; axial loading; torsion; pure bending; transverse

ME 408 Thermal Systems Design (3-0)6

Sistem tasarım kavramları, matematiksel modelleme, optimizasyon metotları, büyük sistemlerin kararlı hal simülasyonu, fan, pompa, ısı değiştirgeçleri, lüleler ve difüzörler, kanallardaki akış, ısı sistemlerin dinamik davranışı.

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 204 Dynamics (2-2)6

Particles and rigid bodies with respect to planar motions; kinematics and kinetics, methods of Newton's second law, work energy and impulse-momentum.

MECE 306 Control Systems I (3-0)6

Design of continuous time control systems, discretizing the systems and controllers, implementing the closed loop system and analyzing and interpreting the results; Laplace transform, transfer functions, stability, steady-state error analysis, root-locus technique, frequency response.

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

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 201 Turkish I (3-0)3

The alphabet; giving and asking personal information, ordering food and drink, telling the time, talking about habits, talking about familiy, talking about clothes, etc.

TURK 202 Turkish II (3-0)3

Vocabulary, structure and communicative skills at beginners level; various themes such as transport, travel, dates, holidays, money, and shopping.