Curriculum		T	P	ECTS

1 st Semester

MATH151	Calculus I	4	2	7
CMPE102	Computer Programming	2	2	4
PHYS101	General Physics I	3	2	6
TURK201	Turkish I	3	0	3
HIST221	History of Civilization	3	0	3
ME108	Computer Aided Solid Modeling	1	3	4,5
ENG101	English For Academic Purposes I	4	0	3,5

2 nd Semester

PHYS102	General Physics II	3	2	6
ENG102	English for Academic Purposes II	4	0	3,5
MATE207	Introduction to Materials Engineering	3	0	5
CHE105	General Chemistry	3	2	5
TURK202	Turkish II	3	0	3
ENE102	Fundamentals of Energy Systems Engineering	1	0	1,5
MATH152	Calculus II	4	2	7

3 rd Semester

MATH275	Linear Algebra	4	0	6
ENG201	English for Academic Purposes III	3	0	3
ENE203	Thermodynamics I	3	0	6
ENE201	Energy Systems I	3	2	9
ME211	Statics and Strength of Materials	3	1	6

4 th Semester

ENE202	Energy Systems II	3	2	5
EE234	Introduction to Electrical Engineering	3	1	5
ENG202	English for Academic Purposes IV	3	0	3
MECE204	Dynamics	2	2	6
MATH276	Differential Equations	4	0	6
ENE204	Thermodynamics II	3	0	5

5 th Semester

Code	Course			
ENG301	English for Occupational Purposes I	3	0	3
ENE399	Summer Practice I	0	0	10
AE307	Fluid Mechanics	3	1	6
ENE302	Heat and Mass Transfer	3	1	6
ENE303	Modeling, Analysis and Simulation	3	1	5
	Area Elective (4)	3	0	5
IE220	Probability and Statistics	3	0	5

6 th Semester

Code	Course			
MECE306	Control Systems I	3	0	6
ENG302	English for Occupational Purposes II	3	0	3
	General Elective	3	0	4
ENE306	Nuclear Energy	3	0	6
EE352	Electromechanical Energy Conversion	3	2	6
	Area Elective (5)	3	0	5

7 th Semester

Code	Course			
ENE499	Summer Practice II	0	0	10
IE305	Engineering Economy	2	0	5
	Area Elective (3)	3	0	5
ENE401	Energy Systems Design Project I	2	2	9
	General Elective	3	0	4
	Area Elective (6)	3	0	5
HIST111	Principles of Atatürk and History of Turkish Revolution I (in English)	2	0	2

8 th Semester

Code	Course			
	Area Elective (1)	3	0	5
	Area Elective (2)	3	0	5
ENE402	Energy Systems Design Project II	2	2	8
HIST112	Principles of Atatürk and History of Turkish Revolution II (in English)	2	0	2
	General Elective	3	0	4
ENE406	Energy Management	3	0	6

Energy Systems Engineering Program Curriculum and Course Description

(1) ENE408, EE454, ME408, ENE415, AET305, AET306, AET315, AET316, AET325, AET326, AET405, AET406, AET415, AET416, 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, AE434,

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

(3) ENE408, EE454, AE434, ENE312TE, ENE308, ENE412TE, ENE415, AET305, AET306, AET315, AET316, AET325, AET326, AET405, AET406, AET415, AET416, 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,

(4) ENE408, EE454, ENE312TE, ENE308, ENE412TE, ENE415, AET305, AET306, AET315, AET316, AET325, AET326, AET405, AET406, AET415, AET416, 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, AE434,

(5) ENE408, EE454, ENE308, ENE312TE, AET305, AET306, AET315, AET316, AET325, AET326, AET405, AET406, AET415, AET416, 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, AE434,

(6) ENE408, EE454, ENE312TE, ENE308, ENE412TE, ENE415, AET305, AET306, AET315, AET316, AET325, AET326, AET405, AET406, AET415, AET416, 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, AE434,

General Electives

HUM322, HUM323, ENG395, HUM319, MAN408, MAN313, ART228, PR419, KOR201, GET304, GET305, GET306, GET307, GET314, GET315, GET316, GET317, GET324, GET325, GET326, GET334, GET335, GET336, GET344, GET345, GET346, GET354, GET355, GET364, GET374, GET384, GET394, GET404, GET405, GET406, GET414, GET415, GET416, GET424, GET425, GET426, GET434, 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, ART293, ART294, CHIN201, CHIN202, PR492, MAN409, MAN415, CHIN301, PR491, MAN428, ART202, ART235, LAW250, CHIN302, GSM147, PR413, ART282, ART284, ECON442, HUM212, ENE497, ENE495, SPAN402, RUS402, ART287, ART285, ART286, RUS401, SPAN401, ART288, ART297, ART289, HUM331, MAN374, KOR202, ART295, HUM291, ART261, ART298, HUM310, ECON318, ART266, KOR301, ART262, ART267, ART226, ART264, HUM202, ART227, HUM105, HUM412, ART270, ART265, MAN437, ART268, MAN414, 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 306	Area Elective Course	(0-0)6
AET 315	Area Elective Course	(0-0)5
AET 316	Area Elective Course	(0-0)6
AET 325	Area Elective Course	(0-0)5

Energy Systems Engineering Program Curriculum and Course Description

AET 326	Area Elective Course	(0-0)6
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 406	Area Elective Course	(0-0)6
AET 415	Area Elective Course	(0-0)5
AET 416	Area Elective Course	(0-0)6
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

Energy Systems Engineering Program Curriculum and Course Description

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 Sytems 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
MFGE 481	Nanofabrication	(3-0)5

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

| AE 434 | Electric and Hybrid Vehicles | (3-1)5 |

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.

| CHE 105 | General Chemistry | (3-2)5 |

Matter and measurement, atoms, molecules and ions, stoichiometry: calculations with chemical formulas and equations, oxidation-reduction reactions, thermochemistry, electronic structure of atoms, periodic properties of the elements, basic concepts of chemical bonding, molecular geometry and bonding theories, gases, intermolecular forces, liquids and solids, chemical kinetics, chemical thermodynamics, electrochemistry.

| 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.

| E 400 | Undergraduate Research Project | (3-0)5 |

Rigorous scholarly research, research methodologies, review of background knowledge, academic reading.

| EE 234 | Introduction to Electrical Engineering | (3-1)5 |

Definition of current, voltage, resistance, power, Kirchoff laws and resistive DC circuits, Thevenin and Norton equivalents, AC circuits, phasors, filters, reactive power, three-phase circuits and power, overview of combinational and sequential digital circuits and examples, diodes and transistors.

| EE 352 | Electromechanical Energy Conversion | (3-2)6 |

Energy Systems Engineering Program Curriculum and Course Description

Electric machinery fundamentals, magnetic circuits and materials, electromechanical energy conversion principles, transformers: the ideal transformer, practical transformers, special transformers, three-phase transformers; DC Machines; DC generators, DC motors, DC motor starters, variable speed control of DC motors, synchronous machines: synchrono

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.

EE 451   Power System Analysis   (3-0)5

Basic concepts in power systems, current and voltage relations on a transmission line, the single-line diagram, per-unit quantities, impedance and reactance diagrams, the admittance model and network calculations, the impedance model and network calculations, power flow analysis, symmetrical faults, symmetrical components, unsymmetrical faults, pow

EE 452   High-Voltage Techniques   (3-0)5

Mechanisms of electrical breakdown in gases, in solid and liquid dielectrics and practical aspects, vacuum insulation, standard impulse voltages, discharge time, breakdown due to pollution.

EE 454   Power Electronics   (3-2)5

Power electronic semiconductor devices, calculation of losses in power semiconductor devices, snubber design, heat sink design, design of snubber circuits, gate drive circuits and isolation, AC choppers, single-phase and three-phase rectifiers, switch mode power supply topologies., inverters.

ENE 102   Fundamentals of Energy Systems Engineering   (1-0)1.5

Energy, energy systems, energy resources, fossil, renewable and nuclear sources, energy conversion and transportation, environment, climate change, carbon capture.

ENE 201   Energy Systems I   (3-2)9

Working principles and calculations of hydrogen energy, solar, wind, hydro, geothermal, wave and biomass energy, environmental effects.

ENE 202   Energy Systems II   (3-2)5

Nuclear energy sources, coal, natural gas and oil; operating principles and basic information of fuels and combustion technologies, steam, gas and nuclear power plants; the environmental impact of conventional energy sources.

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 204   Thermodynamics II   (3-0)5

Property relations for pure substances, ideal gases, mixture of ideal gases, and atmospheric air; steam power cycles, refrigeration cycles, spark-ignition and compression-ignition engines, and turbine cycles.

ENE 302   Heat and Mass Transfer   (3-1)6

Basic concepts of heat transfer, mechanisms of heat transfer (conduction, convection, radiation), steady and transient conduction, numerical methods in heat conduction, forced and natural convection, boiling and condensation, heat exchangers, radiation heat transfer, mass transfer.

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 304   Measurement and Instrumentation   (3-0)5

Importance of experiments in engineering, experimental methods, basic concepts, measurement and dynamic response; statistical analysis of experimental data, error types and error analysis, uncertainity, probability, chi-square test, least square methods, coefficient of correlation; measurement of basic electrical quantities, pressure, flow, tempera

ENE 305   Combustion   (3-0)5

Gaseous, liquid, and solid fuels, thermodynamics and kinetics of combustion, adiabatic flame temperature, combustion of gaseous and vaporized fuels, combustion of liquid fuels, combustion of solid fuels.

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 310   Hydropower   (3-0)5

The hydropower theory, reaction turbines, hydroelectric systems, hydropower regulations and efficiency, hydroelectric energy productions.

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 312TE   Wind Energy Technologies   (3-0)2

Rüzgar nitelikleri, rüzgar enerjisi, rüzgar türbinleri, rüzgar türbinlerinin tasarımı, projelendirilmesi, planlaması ve ekonomisi, dalga enerjisi ve dalga enerjisi dönüşüm sistemleri.

ENE 314   Geothermal Energy Technologies   (3-0)5

Thermal structure of the Earth, heat transfer, geothermal systems and resources, exploration techniques, thermal energy of the oceans.

ENE 316   Reactor Design   (3-0)5

Definition of the rate of reaction, the general mole balance equation, batch and continuous flow reactors, conversion and reactor sizing, rate laws and stoichiometry, the reaction rate constant, the reaction order and the rate law, isothermal reactor design, pressure drop in reactors, collection and analysis of rate data, multiple reactions, maximi

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, lightining 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 alkalin 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

Energy Systems Engineering Program Curriculum and Course Description

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 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.

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.

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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.

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 111   Principles of Atatürk and History of Turkish Revolution I (in English)   (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.

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HIST 112   Principles of Atatürk and History of Turkish Revolution II (in English)   (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 220   Probability and Statistics   (3-0)5

Introduction to probability and statistics; random variables and probability distributions; expected value; sampling distributions; one and two sample estimation problems; test of hypotheses; simple linear regression.

IE 305   Engineering Economy   (2-0)5

Economic analysis for engineering and managerial decision-making; cash flows, effect of time and interest rate on money and physical assets; methods of evaluating alternatives: present worth, future worth, annual worth, rate-of-return and benefit/cost ratios; depreciation and taxes; effects of inflation.

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.

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 considerati

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.

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

Energy Systems Engineering Program Curriculum and Course
Description

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, ısıl 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

                        Energy Systems Engineering Program Curriculum and Course
                        Description

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 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.

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

                Energy Systems Engineering Program Curriculum and Course
                Description

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.