

Curriculum		T	P	ECTS
<b>1 st Semester</b>				
MATH151	Calculus I	4	2	7
KRY111	Career Planning	1	0	1
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
PHYS101	General Physics I	3	2	6
CMPE102	Computer Programming	2	2	4
HIST101	Principles of Atatürk and History of Turkish Revolution I	2	0	2
<b>2 nd Semester</b>				
PHYS102	General Physics II	3	2	6
MATE207	Introduction to Materials Engineering	3	0	5
HIST102	Principles of Atatürk and History of Turkish Revolution II	2	0	2
MATH152	Calculus II	4	2	7
CHE105	General Chemistry	3	2	5
ME101	Introduction to Mechanical Engineering	1	0	1,5
ENG102	English for Academic Purposes II	4	0	3,5
<b>3 rd Semester</b>				
ENG201	English for Academic Purposes III	3	0	3
	General Elective	3	0	4
MATH275	Linear Algebra	4	0	6
MFGE205	Introduction to Manufacturing Processes	2	2	5
ENE203	Thermodynamics I	3	0	6
ME201	Statics	3	0	6
<b>4 th Semester</b>				
ENG202	English for Academic Purposes IV	3	0	3
ME210	Strength of Materials	3	1	6
EE234	Introduction to Electrical Engineering	3	1	5
MECE204	Dynamics	2	2	6
	General Elective	3	0	4
MATH276	Differential Equations	4	0	6

<b>5 th Semester</b>				
AE307	Fluid Mechanics	3	1	6
	General Elective	3	0	4
MECE303	Theory of Machines	3	1	6
ENG301	English for Occupational Purposes I	3	0	3
ENE301	Heat Transfer	3	1	6
ME399	Summer Practice I	0	0	6
IE220	Probability and Statistics	3	0	5
<b>6 th Semester</b>				
MECE306	Control Systems I	3	0	6
MATH380	Numerical Methods for Engineers	3	1	5
ME316	Machine Elements	3	1	7
ENG302	English for Occupational Purposes II	3	0	3
ME390	Mechanical Engineering Systems Laboratory	1	3	4
IE305	Engineering Economy	2	0	5
<b>7 th Semester</b>				
	Area Elective (1)	3	0	5
TURK401	Turkish Language I	2	0	2
	Area Elective (2)	3	0	5
ME499	Summer Practice II	0	0	6
	Area Elective (6)	3	0	5
	Area Elective (7)	3	0	5
ME403	Mechanical Systems Design	3	1	8
<b>8 th Semester</b>				
ME404	Design Project	1	4	8
	Area Elective (3)	3	0	5
	Area Elective (4)	3	0	5
	Area Elective (5)	3	0	5
TURK402	Turkish Language II	2	0	2
	Area Elective (8)	3	0	5

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

(2) ENE303, ENE408, ME429, ME454, ME453, ME451, AE434, AE419, AE312, AET305, AET306, AET315, AET316, AET325, AET326, AET335, AET336, AET345, AET346, AET355, AET356, AET365, AET366,

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(3) ENE303, ENE408, ME429, ME454, ME453, AET305, AET306, AET315, AET316, AET325, AET326, AET335, AET336, AET345, AET346, AET355, AET356, AET365, AET366, AET376, AET386, AET396, AET405, AET406, AET415, AET416, AET425, AET426, AET435, AET436, AET445, AE404, AE426, MFGE542, APM308, MFGE312, MFGE316, ME452, CEAC423, ENE314, ENE404, MFGE403, AE414, AE417, MFGE482, APM444, EE448, ME491, ME493, ENE204, MECE447, CEAC418, MFGE484, MFGE541, MFGE543, ME425, ME431, ME441, ME472, MATE440, ENE409, ENE422, ENE428, ENE305, MFGE420, ENE426, ME302, ME438, MATE442, ENE411, ENE418, ENE430, AE422, MFGE478, ME424, ME437, ENE316, ENE414, ENE412, MFGE481, MFGE418, MFGE433, ENE421, MFGE577, ENE420, MFGE310, MFGE404, MFGE412, EE452, ME408, ENE424, MFGE406, ENE312, MECE422, MFGE405, MFGE426, EE451, ME435, ENE413, ENE410, ENE416, MECE574, ENE310, MFGE432, ENE403, MFGE434, ME427, ME428, ME482, ME426, ME417, ME421, ME430, ME422, ME420, ME418, ME423, ME419, ME411, ME412, ME413, ME414, ME415, ME416, ME484, MATE464, ENE306, ME433, ME436, ME478, ME481, MECE539, IE441, ME451, AE434, AE419, AE312,

(4) ENE303, ENE408, ME429, ME454, ME453, AET305, AET306, AET315, AET316, AET325, AET326, AET335, AET336, AET345, AET346, AET355, AET356, AET365, AET366, AET376, AET386, AET396, AET405, AET406, AET415, AET416, AET425, AET426, AET435, AET436, AET445, AE404, AE426, MFGE543, APM308, MFGE312, MFGE316, ME452, AE414, MFGE403, APM444, AE417, CEAC423, MFGE482, ENE314, ENE404, EE448, ME491, ME493, CEAC418, MFGE484, MECE447, ENE204, ENE416, ENE428, ENE421, ENE305, EE451, EE452, ENE414, MFGE310, ENE310, ENE418, ENE410, MFGE577, ENE412, MFGE418, MFGE426, MFGE434, ENE316, ENE413, ENE420, MECE422, MFGE432, ME438, ME472, MATE442, ME424, ME425, ME437, ME441, MFGE541, ENE312, MFGE404, MFGE406, MFGE412, ME302, ENE422, ENE424, ENE426, AE422, ME408, ME431, ME435, MECE574, MFGE433, MFGE420, MFGE481, ENE430, MFGE405, MATE440, ENE409, ENE411, MFGE478, MFGE542, ME427, ME428, ME482, ME426, ME417, ME421, ME430, ME422, ME420, ME418, ME423, ME419, ME411, ME412, ME413, ME414, ME415, ME416, ME484, MATE464, ENE306, ME433, ME436, ME478, ME481, MECE539, IE441, ME451, AE434, AE419, AE312,

(5) ENE303, ENE408, ME429, ME454, ME453, ME451, AE434, AE419, AE312, AET305, AET306, AET315, AET316, AET325, AET326, AET335, AET336, AET345, AET346, AET355, AET356, AET365, AET366, AET376, AET386, AET396, AET405, AET406, AET415, AET416, AET425, AET426, AET435, AET436, AET445, ME302, AE404, AE426, MFGE312, APM308, MFGE316, ME452, AE414, ENE404, AE417, MFGE403, MFGE482, APM444, ENE314, CEAC423, ME493, EE448, ME491, MFGE484, CEAC418, MECE447, ENE204, MFGE542, MFGE543, ME441, ENE305, ENE412, ENE430, MECE422, MFGE481, AE422, MECE574, EE451, EE452, MATE442, ENE422, ENE421, ENE420, ENE426, MFGE310, MFGE404, MFGE406, MFGE478, ME424, ME425, ME435, ENE409, ENE411, ENE410, ENE414, ENE403, ME437, ENE316, ENE413, ENE416, ENE310, MFGE405, ENE428, MFGE432, MFGE418, MFGE433, MFGE434, ME408, ME431, ME472, MATE440, MFGE412, MFGE426, ME438, ENE418, ENE424, MFGE577, ENE312, MFGE420, MFGE541, ME427, ME428, ME482, ME426, ME417, ME421, ME430, ME422, ME420, ME418, ME423, ME419, ME411, ME412, ME413, ME414, ME415, ME416, ME484, MATE464, ENE306, ME433, ME436, ME478, ME481, MECE539, IE441,

(6) ENE303, ENE408, ME429, ME454, ME453, AET305, AET306, AET315, AET316, AET325, AET326, AET336, AET345, AET346, AET355, AET356, AET365, AET366, AET376, AET386, AET396, AET405, AET406, AET415, AET416, AET425, AET426, AET435, AET436, AET445, ME302, ME408, ME424, ME438, ME472, MFGE412, MFGE577, ME425, ME431, ME452, ENE314, ENE316, ENE412, MATE442, ME437, ENE310, MFGE418, ME435, ENE305, ENE312, ENE403, ENE411, ENE413, ENE414, ENE416, ENE421, ENE422, ENE430, EE452, E400, MFGE404, MFGE405, MFGE406, MFGE420, MFGE481, ME441, ENE409, ENE410, ENE418, ENE420, ENE424, ENE426, ENE428, EE451, MECE422, MFGE310, MFGE478, MATE440, MFGE432, MFGE426, MFGE433, MFGE434, AET335, AE404, AE426, MFGE541, MFGE542, MFGE543, MFGE316, MFGE403, MFGE312, APM308, AE414, CEAC423, AE417, MFGE482,

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(7) ENE303, ENE408, ME429, ME454, ME453, AET305, AET306, AET315, AET316, AET325, AET326, AET335, AET336, AET345, AET346, AET355, AET356, AET365, AET366, AET376, AET386, AET396, AET405, AET406, AET415, AET416, AET425, AET426, AET435, AET436, AET445, ENE316, ENE411, ENE413, ENE416, MFGE426, MFGE432, ME431, ME441, ENE312, ENE410, ENE305, ENE310, ENE414, MFGE420, MFGE577, ME435, ME438, ENE412, MFGE433, MFGE478, MFGE481, MATE440, ME302, ME408, ME437, ENE421, ENE426, ENE428, EE452, MECE422, MFGE310, MFGE404, MFGE406, ME425, ME452, ME472, ENE314, MFGE412, ME424, ENE403, ENE409, ENE418, ENE420, ENE422, ENE424, ENE430, EE451, E400, MFGE405, MFGE418, MFGE434, MATE442, AE404, AE426, MFGE541, MFGE542, MFGE312, APM308, MFGE316, AE414, AE417, CEAC423, APM444, ENE404, MFGE482, EE448, ME491, ME493, ENE204, MECE447, MFGE484, CEAC418, AE422, MECE574, MFGE543, ME427, ME428, ME482, ME426, ME417, ME421, ME430, ME422, ME420, ME418, ME423, ME419, ME411, ME412, ME413, ME414, ME415, ME416, ME484, MATE464, ENE306, ME433, ME436, ME478, ME481, MECE539, IE441, ME451, AE434, AE419, AE312,

(8) ENE303, ENE408, ME429, ME454, ME453, ME451, AE434, AE419, AE312, AET305, AET306, AET315, AET316, AET325, AET326, AET335, AET336, AET345, AET346, AET355, AET356, AET365, AET366, AET376, AET386, AET396, AET405, AET406, AET415, AET416, AET425, AET426, AET435, AET436, AET445, AE404, AE426, APM308, MFGE312, MFGE316, ME452, AE414, CEAC423, APM444, ENE404, AE417, MFGE403, MFGE482, ENE314, ME491, ME493, EE448, MECE447, MFGE484, CEAC418, ENE204, ENE430, MFGE432, ME302, MFGE541, MFGE542, MFGE420, MFGE404, ENE422, MFGE406, MFGE412, MFGE433, MFGE434, MFGE577, MECE574, ME424, ME437, MATE440, ENE411, ENE416, ENE418, MFGE543, ME435, ME441, EE452, ENE310, ENE412, MECE422, EE451, ENE410, ENE424, MFGE478, ENE312, MFGE481, MFGE310, ENE420, ENE421, ME425, ME431, ME438, ENE316, ENE426, ENE305, ME408, AE422, ME472, ENE413, MFGE418, MFGE426, ENE414, MATE442, ENE409, ENE403, ENE428, MFGE405, ME427, ME428, ME482, ME426, ME417, ME421, ME430, ME422, ME420, ME418, ME423, ME419, ME411, ME412, ME413, ME414, ME415, ME416, ME484, MATE464, ENE306, ME433, ME436, ME478, ME481, MECE539, IE441,

## General Electives

HUM322, HUM323, HUM204, ENG395, HUM319, MAN313, MAN408, ART228, PR419, ECON325, GET304, GET305, GET306, GET314, GET315, GET316, 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, MAN428, CHIN301, ART202, ART235, ART293, ART294, CHIN202, PR492, CHIN201, PR491, MAN409, MAN415, KOR201, CHIN302, HUM320, HUM331, ART282, ART284, IR423, HUM360, HUM316, HUM312, HUM321, ECON442, HUM212, SPAN402, RUS402, ART287, HUM203, ART286, ART285, RUS401, SPAN401, ART288, ART261, ART297, ART289, AVM490, MAN374, KOR202, ART295, ART290, HUM291, ECON318, ART298, ART266, KOR301, HUM310, ART226, HUM202, ART262, ART264, ART267, ART227, HUM105, HUM412, ART268, ART265, MAN328, MAN437, MAN414, MAN412, ART269, ART270, PR414, LAW250,

## Area Elective Course List

AE 312	Internal Combustion Engines	(3-1)5
AE 404	Transmission Systems and Design	(2-2)6
AE 414	Active and Passive Automobile Safety	(3-1)5
AE 417	Introduction to Finite Element Analysis	(2-2)5

AE 419	Internal Combustion Engine Design	(2-2)5
AE 422	Vehicle Aerodynamics	(3-1)5
AE 426	Design And Manufacturing Of Armored Vehicles	(3-1)5
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
AET 326	Area Elective Course	(0-0)6
AET 335	Area Elective Course	(0-0)5
AET 336	Area Elective Course	(0-0)6
AET 345	Area Elective Course	(0-0)5
AET 346	Area Elective Course	(0-0)6
AET 355	Area Elective Course	(0-0)5
AET 356	Area Elective Course	(0-0)6
AET 365	Area Elective Course	(0-0)5
AET 366	Area Elective Course	(0-0)6
AET 376	Area Elective Course	(0-0)6
AET 386	Area Elective Course	(0-0)6
AET 396	Area Elective Course	(0-0)6
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
AET 425	Area Elective Course	(0-0)5
AET 426	Area Elective Course	(0-0)6
AET 435	Area Elective Course	(0-0)5
AET 436	Area Elective Course	(0-0)6
AET 445	Area Elective Course	(0-0)5
APM 308	Piston Engines	(3-2)5

APM 444	Rocket and Missile Technology	(3-0)5
CEAC 418	Applied Polymer Science	(2-2)5
CEAC 423	Polymer Science and Technology	(3-0)5
CMPE 468	Machine Learning for Engineers	(3-0)5
E 400	Undergraduate Research Project	(3-0)5
EE 448	Pattern Recognition	(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
ENE 204	Thermodynamics II	(3-0)5
ENE 303	Modeling, Analysis and Simulation	(3-1)5
ENE 305	Combustion	(3-0)5
ENE 306	Nuclear Energy	(3-0)6
ENE 308	Solar Energy Technology	(3-1)5
ENE 310	Hydropower	(3-0)5
ENE 312	Wind Energy Technologies	(3-1)5
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 413	Global Finance	(3-0)5
ENE 414	Global Energy	(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
IE 314	Project Management	(3-0)5
IE 322	Industrial Engineering Practices in Energy Sector	(3-0)5
IE 441	Optimization in Data Analytics	(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 440	Corrosion and Oxidation of Metals	(3-0)5
MATE 442	Welding Metallurgy and Technology	(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 464	Surface Processing of Materials	(3-0)5
ME 302	Fluid Mechanics II	(3-0)5
ME 408	Thermal Systems Design	(3-0)6
ME 411	Metal Forming	(3-1)5
ME 412	Metal Cutting	(3-1)5
ME 413	Tool and Die Design	(2-2)5
ME 414	Computer Integrated Manufacturing	(3-1)5
ME 415	Rapid Prototyping	(3-0)5
ME 416	Casting and Powder Metallurgy	(3-1)5
ME 417	Joining Technologies	(3-0)5
ME 418	Advanced Strength of Materials	(3-0)5
ME 419	Manufacturing of Automobiles	(3-0)5
ME 420	Project Management in Manufacturing	(3-0)5

ME 421	Polymer Processing	(3-0)5
ME 422	Statistical Analysis and Instrumentation	(3-1)5
ME 423	Introduction to Distortion Engineering	(3-1)5
ME 424	Nuclear Energy	(3-0)5
ME 425	Mechanical Vibrations	(3-0)5
ME 426	Dynamics of Machinery	(3-0)5
ME 427	Kinematic Synthesis	(3-0)5
ME 428	Introduction to Optimization	(3-0)5
ME 429	Introduction to Biomechanics	(3-1)5
ME 430	Finite Element Analysis for Manufacturing	(2-2)5
ME 431	Failure Analysis	(3-0)5
ME 433	Residual Stresses	(3-1)5
ME 435	Fracture Mechanics	(3-0)5
ME 436	Fluid Mechanics II	(3-0)5
ME 437	Introduction to Computational Fluid Dynamics	(3-0)5
ME 438	Pipeline Fundamentals and Design	(3-0)5
ME 441	Gas Dynamics	(3-0)5
ME 451	Quality Management and Quality Engineering	(3-1)5
ME 452	Introduction to Fluid Power Control	(3-0)5
ME 453	Heat Exchanger Design	(3-0)5
ME 454	Design of Hydraulic Machines	(3-0)5
ME 472	Energy Engineering	(3-0)5
ME 478	Production Plant Design	(3-0)5
ME 481	Nanofabrication	(3-0)5
ME 482	Introduction to CAD/CAM	(2-1)5
ME 484	Plastic Injection Moulding Technology	(3-1)5
ME 488	Production Design and Prototyping	(1-4)5
ME 491	CO_OP Practice I	(0-3)5
ME 493	CO_OP Practice II	(0-3)5
MECE 322	Multidisciplinary Design in Engineering	(2-2)5
MECE 422	Multidisciplinary Engineering Design	(2-2)5



MECE 447	Path Planning and Navigation	(3-0)5
MECE 539	Flying Robotics	(3-0)5
MECE 574	Industrial Automation and Robotics Technology	(3-0)5
MFGE 310	Finite Element Analysis for Manufacturing	(2-0)5
MFGE 312	Statistical Analysis and Instrumentation	(3-1)5
MFGE 316	Casting and Powder Metallurgy	(3-1)6
MFGE 403	Tool and Die Design	(2-0)5
MFGE 404	Computer Integrated Manufacturing	(3-0)5
MFGE 405	Rapid Prototyping	(3-0)5
MFGE 406	Joining Technologies	(3-0)5
MFGE 412	Introduction to Optimization	(3-0)5
MFGE 418	Advanced Strength of Materials	(3-0)5
MFGE 420	Project Management in Manufacturing	(3-0)5
MFGE 426	Manufacturing of Automobiles	(3-0)5
MFGE 432	Polymer Processing	(3-0)5
MFGE 433	Residual Stresses	(3-0)5
MFGE 434	Introduction to Distortion Engineering	(3-0)5
MFGE 478	Production Plant Design	(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
MFGE 541	Theory of Metal Cutting	(3-0)5
MFGE 542	Theory of Metal Forming	(3-0)5
MFGE 543	Theory of Sheet Metal Forming and Die Design	(3-0)5
MFGE 577	Quality Control and Metrology	(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 312 Internal Combustion Engines (3-1)5

Engine history, ideal engine cycles, principles of SI and CI engine operation, 2-stroke and 4-stroke engines, real cycles, performance characteristics, fuel supply system, ignition system, cooling system, heat transfer, emissions, and friction.

AE 404 Transmission Systems and Design (2-2)6

Review of basic gear theory: types of gears, gear wear, bearings, basic gear adjustments, gear trains and transmission; drivetrain: engine, transmission, transmission gears, final drive and differential; gearbox requirements; manual, dual clutch and automatic transmission; transmission electronics and mechatronics, gear shifting, AWD systems and t

AE 414 Active and Passive Automobile Safety (3-1)5

Introduction to automobile safety subject; crash types; brake systems; traction and stability systems; passenger restraint systems; energy absorbing; intrusion resistance; safety in hybrid, electric and alternative fuel vehicles; autonomous vehicles; developing safety technologies.

AE 417 Introduction to Finite Element Analysis (2-2)5

Solving partial differential equations of mechanics numerically; fundamentals of the finite element method including weak form, shape functions, iso-parametric approximation, Gauss quadrature, element types, assembly operation, sparsity pattern with application to 2D problems; self-written finite element code in MATLAB; computational simulations of elastic materials and stress analysis using the MATLAB code; domain discretization, pre-processing and post-processing aspects.

AE 419 Internal Combustion Engine Design (2-2)5

Introduction to basic concepts of engine design; critical index; indicated and effective power, pressure, torque; crank-connecting rod mechanism.

AE 422 Vehicle Aerodynamics (3-1)5

Fundamentals of fluid mechanics; Navier-Stokes equations; analysis of aerodynamic drag, drag force calculation, and computational and experimental techniques to obtain drag coefficient.

AE 426 Design And Manufacturing Of Armored Vehicles (3-1)5

Armored vehicle survivability concepts; threat types; basics of armor materials; penetration mechanics; metallic, ceramic and composites used in armor design; protection against blast; high strain-rate test methods for deriving constitutive and failure behavior of materials; specialized test methods for verification of protection levels; computational techniques used to predict structural failure.

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.

APM 308 Piston Engines (3-2)5

Fundamentals, engine performance, engine construction, engine fuel systems, starting and ignition systems, induction exhaust and cooling systems, supercharging/turbocharging, lubricants and fuels, lubrication systems, engine indication systems, powerplant installation, engine monitoring and ground operation, engine storage and preservation.

APM 444 Rocket and Missile Technology (3-0)5

Entry information for rocket and missile design, problems of full-scale effects by the atmosphere, rocket fuel, solid fuel rockets, liquid fuel rocket and missiles, fuel composition, combustion, fuel grain, rocket engines, nozzle flow, rocket performance parameters, propulsion, propulsion coefficient, characteristic exhaust output velocity, impulse

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 (methylmethacrylate), 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 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

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.



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 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, maxim

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 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, CO<sub>2</sub> 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 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 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.		
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 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 441      Optimization in Data Analytics      (3-0)5



The concept of linear algebra, probability, linear programming, integer programming, mixed-integer programming, and non-linear programming applications in data analytics such as regression, classification, neural networks; introduction to Python programming and using different Python programming packages to solve data analytics problems.

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 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 440 Corrosion and Oxidation of Metals (3-0)5

Introduction to corrosion, thermodynamic and kinetic aspects of corrosion and oxidation, types of corrosion, corrosion in various environments, corrosion of engineering materials, corrosion testing, control and prevention methods, corrosion in material selection and design.

MATE 442      Welding Metallurgy and Technology      (3-0)5

Welding related terms and definitions, classification of the welding processes, frequently used welding processes, their application areas, advantages and disadvantage, typical welding discontinuities, destructive and nondestructive tests applied on welded joints, quality aspects, welding metallurgy of ferrous and nonferrous metals, effects of the

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 464      Surface Processing of Materials      (3-0)5

Characterization of surfaces, interaction of surfaces, theory of contact mechanics, surface hardening methods, carburizing, conversion coatings, surface coating methods: gaseous, solution and molten state deposition processes, principles of physical and chemical vapor deposition, electrochemical deposition, spray coatings.

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.

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 101 Introduction to Mechanical Engineering (1-0)1.5

History of mechanical engineering, its areas of interest and its relationship with the other engineering disciplines, sub-disciplines of mechanical engineering, design, materials, mechanical and thermal sciences, emerging technologies and latest trends in mechanical engineering, skills necessary for a degree in mechanical engineering and

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 201 Statics (3-0)6

Genel tanıtım, parçacıkların statığı, rijit cisimlerin statığı, eşdeğer kuvvet sistemleri, denge, makasların analizi, kirişlerin analizi, sürtünme ve yüzeylerin geometrik özellikleri.

ME 210 Strength of Materials (3-1)6

Concepts of normal and shear stress, strain, axial load, statically indeterminate axially loaded members, torsion, statically indeterminate torque-loaded members, bending of beams, combined loadings, stress and strain transformation, simple loading tension, torsion and bending, deflections with simple loadings, superposition techniques.

ME 302 Fluid Mechanics II (3-0)5

Akışkan hareketinin diferansiyel analizine giriş, süreklilik, momentum ve enerji denklemleri, sıkıştırılmaz sürtünmesiz akış, hız potansiyeli, akım fonksiyonu, temel düzlemsel akış, boyut analizi ve benzerlik, sıkıştırılmaz viskoz akış, Navier-Stokes denklemleri, laminer, türbülanslı akışta sınır tabaka, daldırılmış cisimler etrafında akış.

ME 316 Machine Elements (3-1)7

2-D and 3-D stress analysis; static failure criteria, factor of safety; fatigue failure criteria, S-N curves, stress concentration; design of shafts and detachable joints; design of threaded fasteners and power screws; design of rolling contact bearings; power transmission; design of gear drives, spur gears, helical gears; design of belt drives;

ME 390 Mechanical Engineering Systems Laboratory (1-3)4

Experimental systems, measurement devices, fundamental concepts in measurement and experimentation; designing a measurement system, treatment of experimental data, measurement errors and uncertainty.

ME 399 Summer Practice I (0-0)6

A minimum of four weeks (twenty working days) summer practice at the shop floor of a suitable factory;





ME 425 Mechanical Vibrations (3-0)5

Temel tanımlar, tek serbestlik dereceli sistemler, titreşim yalıtımı, iki serbestlik dereceli sistemler: hareket denklemleri, koordinat dönüşümleri, temel koordinatlar, titreşim modları, torsiyonel titreşim, çoklu serbestlik dereceli sistemler, koordinat dönüşümler ve normal koordinatlar, modal analiz, harmonik zorlamalı sistemlerin çözümü.

ME 426 Dynamics of Machinery (3-0)5

Kinematic influence coefficients, equation of motion of single degree of freedom systems, analytical and numerical solution methods, effects of dry and viscous friction, force analysis and power flow in simple and planetary gear trains, rotating mass balancing, balancing of inertia-variant machines, analysis of unbalance in multi-cylinder engines

ME 427 Kinematic Synthesis (3-0)5

Introduction to synthesis, graphical and analytical methods in dimensional synthesis. Two, three and four positions of a plane. Correlation of crank angles. Classical transmission angle problem. Optimization for the transmission angle. Chebyshev theorem. Current topics in mechanism synthesis.

ME 428 Introduction to Optimization (3-0)5

Introduction to optimization, graphical optimization, least squares regression, linear and non-linear programming, numerical techniques, unconstrained and constrained optimization, global optimization (genetic algorithm) applications.

ME 429 Introduction to Biomechanics (3-1)5

Basic anatomy and physiology of skeletal and muscular systems, mechanical properties of hard and soft tissues, muscle mechanics, joint types and mechanical representation of joints, body anthropometry, human body modeling, computer simulation modeling, motion analysis, mechanics of spinal column, clinical biomechanics, sports biomechanics.

ME 430 Finite Element Analysis for Manufacturing (2-2)5

Direct approach, plane strain, plane stress and axisymmetric problems, principle of virtual work based formulation for 2D problems, FEM for heat transfer problems.

ME 431 Failure Analysis (3-0)5

Hata türleri, makro ve mikro çatlak mekanizmaları, hata nedenleri: defolu malzeme, yanlış tasarım, uygun olmayan malzeme seçimi, yanlış imalat ve montaj, hata analizi, vaka incelemeleri.

ME 433 Residual Stresses (3-1)5

Residual stresses, measurement techniques, sources of residual stresses, development of residual stresses based on the manufacturing method, effect of residual stresses on subsequent manufacturing processes, effect of residual stresses on service performance and failure.

ME 435 Fracture Mechanics (3-0)5

Metallerde kırılma türleri, Griffith gevrek kırılma teorisi, çatlak yayılımı, sünek kırılma, elastik-plastik kırılma mekaniği, çentik etkileri, enerji-sıcaklık eğrileri, gerilim yoğunluğu katsayısının belirlenmesi, kırılma tasarımının felsefesi; meneviş gevrekliği, hidrojen gevretmesi, lineer elastik-plastik kırılmanın kararsızlığı, yorulma çatlağı

ME 436 Fluid Mechanics II (3-0)5

Introduction to differential analysis of fluid motion, continuity, momentum and energy equations, incompressible inviscid flow, velocity potential, stream function, elementary plane flows, dimensional analysis and similitude, incompressible viscous flow, Navier-Stokes equations, boundary layer in laminar and turbulent flow, fluid flow about immerse

ME 437 Introduction to Computational Fluid Dynamics (3-0)5

Hesaplamalı akışkanlar mekaniğine giriş, akışkanlar mekaniğinin temel denklemleri, temel hesaplamalı teknikler, sayısal şemaların özellikleri, sonlu farklar yöntemi, sonlu elemanlar yöntemi, denklem sistemlerinin çözüm yöntemleri, ağ (mesh) oluşturma.

ME 438 Pipeline Fundamentals and Design (3-0)5

Gaz ve sıvı akışkanların boru hatlarıyla taşıma ve dağıtma sistemleri, tasarımda kullanılması gereken malzemeler, mekanik hususlar, tasarım, yapısal ve ekonomik yönleri, boru hattı taşımacılığı, sıvı, gaz maddelerin boru hatlarındaki akışı, boru hattı bileşenleri, pompa ve kompresör ilişkileri, taşıma, dağıtma tasarımı, maliyet, yapısal, işletimsel

ME 441 Gas Dynamics (3-0)5

Sıkıştırılabilir akış dinamiği ve termodinamiği, bir boyutlu isentropik akış, lüleler, difüzörler, normal ve eğik şoklar, sürtünme ve ısıtma ile akış, iki boyutlu Prandtl-Meyer akışı ve karakteristik yöntemi, genel gaz dinamik akışı için bilgisayar çözümleri.

ME 451 Quality Management and Quality Engineering (3-1)5

Quality of engineering material and products, quality in design, quality in manufacturing, quality control, inspection and testing, non-conformities and failure modes in material and products, quality management, quality improvement techniques, quality related engineering practices.

ME 452 Introduction to Fluid Power Control (3-0)5

Hidrolik ve pnömatik sistem elemanları, özellikleri ve kullanım alanları, pompalar ve performans özellikleri, hidrolik ve pnömatik valfler ve akış özellikleri, yön, akış ve basınç kontrolü valfleri, rezervuarlar, akümülatörler, aktüatörler, filtreleme, hidrolik ve pnömatik devre tasarımı.

ME 453 Heat Exchanger Design (3-0)5

Classification of heat exchangers, basic design methods of heat exchangers (LMTD and epsilon-NTU), forced convection correlations for single-phase heat exchangers, heat exchanger pressure drop and pumping power, fouling of heat exchangers, calculation steps of designing heat exchangers, thermodynamic modeling and analysis of heat exchangers, design and simulation of heat exchangers, students will be asked to complete a design project of heat exchanger.

ME 454 Design of Hydraulic Machines (3-0)5

General concepts and classification of hydraulic machines; types, characteristics, and working curves of pumps; series and parallel connection of pumps; one pump feeding two separate tanks; hydroelectric power plants; hydrodynamic simulation; operation of pumps at different cycles; cavitation; hydraulic turbines: Francis, Kaplan, Propeller, and Pelton; comparison of impact type and reaction type turbines

ME 472 Energy Engineering (3-0)5

Enerji ve enerji ekonomisi, enerji çevrim sistemlerinin ekonomik ve çevresel analizi, buhar, gaz ve buhar-gaz çevrimleriyle çalışan termik santraller, termik santrallerin tasarımında çevrim analizi, sentezi ve





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 303      Theory of Machines      (3-1)6

Introduction to mechanisms: basic concepts, mobility, basic types of mechanisms; position, velocity and acceleration analysis of linkages; cam mechanisms, gear trains; static and dynamic force analysis of mechanisms.

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

MECE 447      Path Planning and Navigation      (3-0)5

Introduction, kinematic models for mobile robots, mobile robot control, robot attitude, robot navigation, path finding, obstacle mapping and its application to robot navigation, application of Kalman filtering.

MECE 539      Flying Robotics      (3-0)5

Basics about flying robots; VTOL systems (such as quadrotor platforms) with rotating wings; fixed wing systems; mathematical models, control algorithms, sensor systems, estimation and identification practices, control hardware, and the experimental setups related with the flying robots.

MECE 574      Industrial Automation and Robotics Technology      (3-0)5

Principles of industrial automation systems, system approach for automated machinery and plants; advanced topics in pneumatic and hydraulic components and systems, design of pneumatic and hydraulic systems; principles of industrial robots and their role in industrial automation, mobile robots, robot arms, AS/RS; design issues in industrial automation

MFGE 205      Introduction to Manufacturing Processes      (2-2)5

Mechanical and physical properties of materials, metal casting, mechanical deformation processes (bulk and sheet forming), machining and joining operations, powder metallurgy, non traditional processes, micro and nano fabrication technologies.

MFGE 310      Finite Element Analysis for Manufacturing      (2-0)5

Direct approach, plane strain, plane stress and axisymmetric problems, principle of virtual work based formulation for 2D problems, FEM for heat transfer problems.

MFGE 312      Statistical Analysis and Instrumentation      (3-1)5

Basic concepts, analysis of experimental data, working principles of basic electrical measurements and sensing devices.

MFGE 316      Casting and Powder Metallurgy      (3-1)6

Fundamentals of casting, solidification of pure metals, solidification of alloys, riser and runner design, feeding distance calculations, Bernoulli equations and sprue design, mold materials, casting problems and defects.

MFGE 403      Tool and Die Design      (2-0)5

Introduction, definitions of jigs and fixtures, types of fixtures, design and manufacturing of jigs and fixtures, FE analysis of loading and stress analysis of jigs during processes.

MFGE 404      Computer Integrated Manufacturing      (3-0)5

Introduction, computer aided design (CAD) systems, computer aided graphical modeling, CAD databases, computer aided manufacturing (CAM) systems, computer aided process Planning (CAPP) systems, robotic systems, group technology and cellular manufacturing systems, automated material handling systems, automated inspection systems, flexible manufacturi

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 406      Joining Technologies      (3-0)5

Stress analysis, static and fatigue failure criteria for joined structures. Design methods for mechanical fastening, welding and adhesive bonding; manufacturing of joints (i.e. installation of fasteners, application on adhesive on substrates); maintenance of joints (e.g. corrosion protection, inspection, etc.).

MFGE 412      Introduction to Optimization      (3-0)5

Introduction to optimization, graphical optimization, least squares regression, linear and non-linear programming, numerical techniques, unconstrained and constrained optimization, global optimization (genetic algorithm), applications.

MFGE 418      Advanced Strength of Materials      (3-0)5

Analysis of stress and strain, principle stresses and strains, generalized Hooke's law, strain energy, yield and failure criteria, plane strain and plane stress problems, airy stress function, unsymmetrical bending of beams and shear center, torsion of noncircular cross sections, Prandtl's membrane analogy, energy methods, plastic deformation and r

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 426 Manufacturing of Automobiles (3-0)5

Manufacturing techniques used in automobile industry, automobile parts and manufacturing methods ?cast parts, machined parts, parts produced by metal forming, sheet deformation processes, polymers and composite parts -, assembly, welded parts and welding techniques, production lines, design of automobile parts considering production.

MFGE 432 Polymer Processing (3-0)5

Introduction to hydrocarbons and macromolecular structures, homopolymers, copolymers, elastomers, blends and thermosets, morphology of polymers, semicrystalline and amorphous 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 433 Residual Stresses (3-0)5

Residual stresses, measurement techniques, sources of residual stresses, development of residual stresses based on the manufacturing method, effect of residual stresses on subsequent manufacturing processes, effect of residual stresses on service performance and failure.

MFGE 434 Introduction to Distortion Engineering (3-0)5

Distortion, distortion potential, distortion potential carriers, compensation potential, production step based solutions, intelligent process chain design, predictive methods, use of in-situ measurement techniques and adaptive process control.

MFGE 478 Production Plant Design (3-0)5

Introduction, fundamentals of design and CAD, manufacturing systems (CAD/CAM, FMS, CIM), market survey and plant location, plant layout, process analysis, quantity and quality planning and controlling for production, process and machine selection, materials handling, storage types, safety regulations, maintenance, environmental factors, research an

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.

MFGE 541      Theory of Metal Cutting      (3-0)5

Introduction, machine tools and machining operations ?turning, drilling and milling, abrasive machining, mechanics of metal cutting; tool life and tool wear, economics of metal cutting operations, chip control, machine tool vibrations, grinding.

MFGE 542      Theory of Metal Forming      (3-0)5

Elements of the theory of plasticity, fundamentals of metal working, forging process, rolling process, extrusion process, drawing of rods, wires and tubes, sheet metal forming process, high energy rate forming.

MFGE 543      Theory of Sheet Metal Forming and Die Design      (3-0)5

Material properties, sheet deformation processes, deformation of sheet in plane stress, simplified stamping analysis, load instability and tearing, bending of sheet, simplified analysis of circular shells, cylindrical deep drawing, stretching of circular shells, combined bending and tension of sheets, hydroforming, introduction to finite element an

MFGE 577      Quality Control and Metrology      (3-0)5

Elementary metrology, linear-angular and comparative measurement, instruments and gauges for testing straightness, flatness, squareness, parallelism, limits, fits and gauges, inspection, quality function in industry, fundamentals of statistical concept in quality control, control charts in SQC, sampling inspection, operation characteristics (OC) cu

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.

