



NEAR EAST
UNIVERSITY

**DEPARTMENT OF Mechanical
Engineering**

***Course Structure Diagram with Course
Credits***

2021-2022

Courses List with Near East University credits and ECTS

CURRICULUM

FIRST YEAR – FALL SEMESTER				
<u>Code</u>		<u>CourseName</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
CHM	101	General Chemistry	4 / 5	
ENG	101	English I	3 / 3	
MTH	101	Mathematics I	4 / 5	
PHY	101	General Physics I	4 / 5	
ECC	103	Engineering Drawing I	3 / 8	
CAM	100	Campus Orientation	0 / 2	
CHC	100	Cyprus History and Culture	2 / 2	
			20/30	
FIRST YEAR – SPRING SEMESTER				
<u>Code</u>		<u>Course Name</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
MEE	104	Introduction to Mechanical Engineering	2 / 7	
ENG	102	English II	3 / 3	ENG101
MTH	102	Mathematics II	4 / 6	MTH101
PHY	102	General Physics II	4 / 6	PHY101
ECC	101	Introduction to Computers and Programming	3 / 4	
YİT	101	Turkish for Foreign Students I	2 / 2	
CAR	100	Career Planning	0 / 2	
			18/30	
SECOND YEAR – FALL SEMESTER				
<u>Code</u>		<u>Course Name</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
MTH	201	Ordinary Differential Equations	4 / 6	MTH102
ECC	206	Statics	4 / 7	PHY101
ECC	207	Thermodynamics I	4 / 7	
ECC	211	Engineering Materials	4 / 7	
ENG	201	English III	3 / 3	ENG102
			19/30	
SECOND YEAR – SPRING SEMESTER				
<u>Code</u>		<u>Course Name</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
MTH	232	Mathematics for Engineers	3 / 5	MTH101
ECC	222	Manufacturing Technology	4 / 6	ECC211
ECC	208	Thermodynamics II	3 / 5	ECC207
ECC	212	Dynamics	3 / 5	PHY101

ECC	224	Strength of Materials	4 / 6	ECC206
ME	200	Workshop Training	0 / 1	ECC222
YİT	102	Turkish for Foreign Students II	2 / 2	YİT101
			19/30	

THIRD YEAR – FALL SEMESTER

<u>Code</u>		<u>Course Name</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
ECC	304	Fluid Mechanics I	4 / 7	MTH201
ECC	307	Machine Design I	4 / 7	ECC224
ECC	317	Principles of CAE	3 / 6	
FNTE		Free Non-Technical Elective	3 / 5	
MTH	323	Numerical Analysis	3 / 5	MTH102
			17/30	

THIRD YEAR – SPRING SEMESTER

<u>Code</u>		<u>Course Name</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
ECC	214	Electrical Machinery	3 / 5	PHY102
ECC	308	Machine Design II	4 / 6	ECC307
ECC	310	Control Systems	3 / 5	MTH201
ECC	314	Dynamics of Machine Systems	4 / 6	ECC212/MTH201
ECC	316	Heat Transfer	4 / 6	MTH201
ME	300	Industrial Training	0 / 2	ME200
			18/30	

FOURTH YEAR – FALL SEMESTER

<u>Code</u>		<u>Course Name</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
ECC	424	Experimental Analysis of Mech. Eng. Systems	3 / 8	
TE		Technical Elective	3 / 6	
TE		Technical Elective	3 / 6	
TE		Technical Elective	3 / 6	
MEE	427	Engineering Ethics	2 / 2	
AIT	103	Atatürk's Princ. And Reforms II	2 / 2	
			16 / 30	

FOURTH YEAR – SPRING SEMESTER

<u>Code</u>		<u>Course Name</u>	<u>Credit/ECTS</u>	<u>Prerequisite</u>
ME	400	Graduation Project	4 / 8	
TE		Technical Elective	3 / 6	
TE		Technical Elective	3 / 6	
RNTE		Restricted Non-Technical Elective	3 / 6	
MEE	450	Power Plant Training	2 / 2	ME300
AIT	104	Atatürk's Princ. And Reforms II	0 / 2	AIT103
			15/30	
		Total	142 / 240	

TECHNICAL ELECTIVE COURSES

ME 401	Hydraulic Machinery
ME 411	Heating, Ventilating, Air Conditioning and Cooling Systems
ME 416	Solar Engineering
ME 418	Refrigeration Techniques
ME 423	Heat Exchanger Design
ME 425	Machine Tools and Tool Design
ME 426	Introduction to Finite Elements Method
ME 431	Energy Conversion Systems
ME 433	Mass Transfer
ME 441	Fluid Mechanics II
ME 442	Gas Dynamics
ME 461	Hoisting and Conveying Machines
ME 475	Material Failure Analysis
ECC425	Internal Combustion Engines
ECC433	Heat Treatment
ECC434	Quality Control
ECC453	Materials Engineering
ECC481	Sheet Metal Processes and Mould Design
ECC483	Reverse Engineering Methods

RESTRICTED NON-TECHNICAL COURSES

ECC 426	Economics for Engineers
ECC 427	Management for Engineers

Objectives and contents of the course:

The educational objectives of the Degree Program in Mechanical Engineering reflect the mission of Near East University. The Bachelor of Science program in Mechanical Engineering prepares the students to achieve the following career and professional objectives.

- To acquire a strong foundation in Mechanical Engineering area relevant to the current needs of industry to allow them to successfully compete for demanding and high quality jobs
- Analyze problems, propose algorithmic solutions, and implement them correctly and efficiently by applying their knowledge of mathematics, computing, mechanical systems and development tools.
- Propose engineering solutions using the information/tools and advanced technologies for the related problems of industry and government.
- To acquire clear communication abilities, ethical and social responsibilities for teamwork.
- Make positive contributions to their community and society by applying skills and abilities learned during their undergraduate program in mechanical engineering
- Improve knowledge and skills through lifelong learning and graduate studies.

The individual courses are described below. These courses are offered by the Mechanical Engineering Department together with the objective of each module.

COURSE DESCRIPTIONS

Compulsory Courses

FIRST YEAR

CHM101-General Chemistry (4 Credits): A basic course with emphasizing the metric system. Introduction to atomic theory, stoichiometry. The structural and physical properties of matter. Periodic relationship among elements and periodic table. Gaseous state. Thermochemistry. Energy and enthalpy. Electronic structure of atoms. Electrochemistry. Chemical bonding. *Prerequisite: -*

Objectives of the Course:

Develop fundamental principles of theoretical and applied chemistry, Develop scientific inquiry, complexity, critical thinking, mathematical and quantitative reasoning. Explain phenomena observed in the natural world. Develop basic laboratory skills

ENG101-English I (3 Credits):

ENG 101 for English Departments aims to develop students' awareness of the language used in everyday life situations as well as the vocabulary items used in different topics. The course has been designed to show the students communicatively useful expressions in their immediate environment. Understanding how the language is used to maintain communication or convey meaning in specific situations is prior to how the structures are put together to form the language. The aim is to expose students to some basic functions in some specific situations and topics at A2/B1 level of the CEFR so that the students can easily communicate with the foreign people in their immediate environment and develop their ability to comprehend oral English. **Prerequisite:** -

Objectives of the Course:

To develop students' language skills and capacity to conduct writing task through the vocabulary, listening and speaking skills. To develop their level of knowledge, communicative capacity, and ability to analyze and reflect on the language. To give learners the language they need for real-life, hands-on task like explaining a process or analyzing risk and to put into practice the academic skills that they will need to use during their educations.

MTH101-Mathematics I (4 Credits):

Limits and continuity. Derivatives. Rules of differentiation. Higher order derivatives. Chain rule. Related rates. Rolle's and the mean value theorem. Critical Points. Asymptotes. Curve sketching. Integrals. Fundamental Theorem. Techniques of integration. Definite integrals. L'Hôpital' Rule. **Prerequisite:** -

Objectives of the Course:

Learn more about your academic program, Learn about limits, derivatives. Study integrals, definite integrals. To introduce the basic properties of determinants and some of their applications

PHY101-General Physics I (4 Credits): Measurement, vectors, kinematics, force, mass. Newton's laws, applications of Newton's laws. Work and kinetic energy. Conservation of linear momentum. Impulse, collisions, rotation, moments of inertia. Torque, angular momentum, conservation of angular momentum, static equilibrium.

Prerequisite: -

Objectives of the Course:

Be able to know the basic laws of mechanics. To apply those laws for solving problems. To be able to use his/her knowledge in the fields of other sciences and/or engineering. Understanding how physics approach and solve problems in mechanics.

ECC103-Engineering Drawing I (3 Credits): Introduction to CAD. Principles of engineering drawing (1st and 3rd angle orthographic projections), drawing methodology stages, linework and lettering, isometric and oblique projections, drawing layouts (working drawings and assembly drawings), machine drawing features, sections and sectional views, geometrical constructions and dimensioning principles. **Prerequisite:** -

Objectives of the Course:

To teach the Principles of Technical Drawing and to help students to develop 3D thinking process in drawing, to teach dimensioning principles and to develop analytical thinking process. and to develop questioning/discussion techniques. Students should be able to read and understand the engineering drawings.

CAR100 Career Planning (0 Credit): To introduce students to career methods that will help them adapt to the rapidly changing economic, social, cultural, ethical and legal conditions of the business world and to gain the ability to adapt them to their own lives. *Prerequisite: -*

MEE104-Introduction to Mechanical Engineering (2 Credits): Introduction to mechanical engineering, explanation of the fundamentals concept and principles of mechanical engineering. Preparation the students for four years education period, description the credit systems, and the compulsory and elective engineering courses. Demonstrations in Mechanical Engineering Department laboratories and workshop. Technical trips to various industrial sites. *Pre-Requisite:-*

Objective of the Course:

Introduce the university and campus, Introduction to mechanical engineering. Demonstrations of Mechanical Engineering Department Laboratories and workshops. Introduction Department Lecturers, Courses, and credit systems, Summer training principles, report writing, Technical trips to various industrial sites.

ENG102-English II (3 Credits): ENG 102 for English Departments aims to develop students' awareness of the language used in everyday life situations as well as the vocabulary items used in different topics. The course has been designed to show the students communicatively useful expressions in their immediate environment. Understanding how the language is used to maintain communication or convey meaning in specific situations is prior to how the structures are put together to form the language. The aim is to expose students to some basic functions in some specific situations and topics at A2/B1 level of the CEFR so that the students can easily communicate with the foreign people in their immediate environment and develop their ability to comprehend oral English. *Prerequisite: ENG 101*

Objectives of the Course:

to develop the students' capacity to conduct writing task through the vocabulary, listening and speaking skills ; to reinforce and consolidate the language and skills that the students have learned from earlier courses ; to develop their level of knowledge, communicative capacity, and ability to analyze and reflect on the language; to develop students' language skills to prepare them for their future professional life.

MTH102-Mathematics II (4 Credits): Sequences, Infinite series, Geometric series, The Integral test, The Comparison tests, Power series, Taylor and Maclaurin series, Lines and planes, Functions of several variables, Limits and Continuity, Partial Differentiation, Chain Rule, Tangent plane, Critical points, Global and Local Extrema, Directional Derivatives, Gradient, Divergence and Curl, Multiple integrals with applications, Triple integrals with applications, Triple integrals in Cylindrical and Spherical coordinates, Line-, Surface- and

Volume Integrals, Independence of path, Green's Theorem, Conservative Vector Fields, Divergence Theorem, Stoke's Theorem. **Prerequisite: MTH 101**

Objectives of the Course:

Sequences and Infinite Series; The integral test, comparison test, geometric series, ratio test, alternating series. Power series, Taylor series. Parametric equations and Polar coordinates. Functions of several variables, limits, continuity, partial derivatives, chain rule, extreme of functions of several variables. Multiple integrals: Double integrals, Area, volume, double integral in polar coordinates, surface area, triple integrals, spherical and cylindrical coordinates.

PHY102-General Physics II (4 Credits): Electrical charges. Coulomb's law. Electrical fields. Gauss's law. Electrical potential. Capacitance and dielectrics. Current and resistance. Direct current circuits. Magnetic fields. Sources of the magnetic field. Faraday's law of induction. Inductance and inductors. **Prerequisite: PHY 101**

Objectives of the Course:

Be able to know the basic laws of electricity and magnetism. To apply those laws for solving problems. To be able to use his/her knowledge in the fields of other sciences and/or engineering. Understanding how physics approach and solve problems in electricity and magnetism.

ECC101-Introduction to Computers and Programming (3 Credits): The course is offered to all faculties as a general common course. It involves using modern and basic information technologies effectively. **Prerequisite: -**

Objectives of the Course:

To familiarize the students with computers and computing fundamentals. To be able to analyze and design a solution to a given problem. To enable the students to write structured programs using C programming Language.

YIT101-Yabancılar İçin Türkçe I (2Credits) : Bu ders zorunlu ortak bir ders olarak tüm fakültelere İngilizce olarak sunulmakta olan bir derstir. Erken Osmanlı döneminden Lozan anlaşmasına kadar olan dönemi kapsamakla birlikte, uzaktan öğretim modeli ile tasarlanmış bir derstir. **Prerequisite:-**

Dersin amacı:

Türkçe okuma, yazma, dinleme, ve anlama becerileri kazanmak Seçilen/belirlenen becerileri geliştirmek Seçilen konuların derinlemesine/detaylı bir şekilde incelemek Belirlenen kavram/kuram/konularla ilgili öğrencilerin var olan bilgilerini Geliştirmek.

SECOND YEAR

MTH201-Differential Equations (4 Credits): Ordinary and partial differential equations.

Explicit solutions, Implicit Solution. First-order differential equations, separable, homogenous differential equations, exact differential equations. Ordinary linear differential equations. Bernoulli differential equations. Cauchy-differential equations. High-order ordinary differential equations. Introduction to Laplace transforms. **Prerequisite: MTH 102**

Objectives of the Course:

Introducing first, second and higher order differential equations, and the methods of solving these equations. Emphasizing the important of differential equations and its engineering application. Introducing the Laplace transform and its applications in solving differential equations and other engineering applications. Introducing the series method in solving differential equations.

ECC206-Statics (4 Credits): Composition and resolution of forces, equilibrium of particles and rigid bodies, centroids and center of gravity. Analysis of trusses, frames and machines. Moments and products of inertia, method of virtual work. Friction. **Prerequisite: PHY 101**

Objectives of the Course:

Students will be able to do some force analysis using the some static rules and laws. Students will be able to apply multidimensional static failure criteria in the analysis and design of mechanical components. - Knowledge of various multidimensional static failure criteria for different materials.

ECC207-Thermodynamics I (4 Credits): Basic concepts and definitions of classical thermodynamics. Thermodynamic processes, work and heat interactions. First law for systems and for flow processes. Second law and entropy, irreversibility and availability. **Prerequisite: -**

Objectives of the Course:

Students develop an understanding of the theoretical framework of classical equilibrium thermodynamics and how it applies to energy conversion in technological applications. Students develop the capability to analyse the energy conversion performance in a variety of modern applications.

ECC211-Engineering Materials (4 Credits): Materials and properties. Atomic structure and interatomic bonding, crystal structure, crystal imperfections, solid solutions. Mechanical properties of materials, elastic and plastic deformation. Behaviour of materials under tension, compression and shear. Hardness and hardness measurement. Dislocation and strengthening mechanism. Phase equilibria, phase diagrams, the iron –carbon system, solid reactions, microstructures. Structure and properties of ceramics. Polymer structure. **Prerequisite: -**

Objectives of the Course:

Provide a conceptual framework for understanding the behavior of engineering materials by emphasizing important relationships between internal structure and properties and to present a general picture of the nature of materials and the mechanisms that act upon, modify, and control their properties.

ENG201-English III (3 Credits): ENG 201 for English Departments aims to develop students' oral communication skills. To achieve this aim, the course has been designed to teach presentation skills. The course starts from the very basics of developing presentation skills such as using your body language, tone of voice and eye contact. It then develops into how to do research for a presentation, how to prepare drafts, how to put it all together, how to use powerpoint to support a presentation, how to prepare effective visuals and finally how to present. To support all these, the syllabus aims to teach the phrases used for opening and structuring a presentation, emphasizing important points, making recommendations during a presentation and summarizing and concluding a presentation. Additionally, the course also includes guidance about how to respond to comments or how to answer questions during a presentation. *Prerequisite: ENG 102*

Objectives of the Course:

The main goal is to enhance the students' competence and willingness to express themselves in an organized manner in academic and professional contexts, and to interact with others confidently. to develop the skill of reading for information from a wide variety of authentic Engineering texts. To develop the ability to participate in exchanges of information and opinions in the context of IT and Engineering. To develop communication skills for the job market which is becoming increasingly common to have give presentation in English.To write instructions, descriptions and explanations about topics in Engineering.

MTH232-Mathematics For Engineers (3 Credits): Complex numbers, Matrix algebra, Methods of solution of linear equation systems.Vectors in 2D-Space and 3D-Space, Eigenvalues, Eigenvectors, Diagonalizations, Fourier Series. Applied Probability and Statistics. *Prerequisite: MTH101*

Objectives of the Course:

To provide necessary mathematical and programming background for analysing, processing and presenting experimental data gathered from the experiments conducted on mechanical engineering applications.

ECC222-Manufacturing Technology (4 Credits): Course description : Basic manufacturing processes, plastic forming of ferrous and nonferrous metals, hot working processes, cold working processes, pipe manufacturing, sheet metal working, basic machine tools and cutting tools chip removal processes, metal casting technology, welding technology, types of welding processes. *Pre-Requisite: ECC211*

Objectives of the Course:

This course is to provide students with an understanding of the manufacturing technologies being used by different machines and tools in manufacturing industries in the area of metal cutting and processes. Students can explain how safety issues were addressed in a manufacturing process; identify the impacts of new technologies and/or techniques on the suitability of different types of manufacturing methods.

Students will be able understand the principles/problems for casting or welding processes and types of moulding. It will also see how to be formed the defects on the casted samples.

ECC208-Thermodynamics II (3 Credits): Thermodynamic cycles. Thermodynamics of mixtures and solutions, chemical reactions. Thermodynamic and mechanics of compressible fluid flow. Thermodynamic of energy conversion systems, refrigeration and air conditioning.
Prerequisite: ECC207

Objectives of the Course:

To be able to understand the working principles of the ideal Otto, Diesel and Brayton which are ideal gas cycles and to make the necessary efficiency calculations. Examination of cycles of steam and refrigeration machines and calculation of required efficiency.

ECC212-Dynamics (3 Credits): A study of motion particles and rigid bodies. Application of Newton's second law to planar motions of rigid bodies, energy and momentum principles. Free, forced and damped vibrations of particle. Central force motions. Inertia tensor. Euler's equation of motion. *Prerequisite: PHY101*

Objectives of the Course:

This course teaches students how to apply Newtonian physics to analyse relatively simple physical mechanisms. - with some emphasis on commonly encountered engineering applications.

ECC224-Strength of Materials (4 Credits): Introduction. Concept of Stress. Stress and Strain. Hooke's Law. Axial Loading. Moment of inertia of cross-sections. Torsion. Pure Bending. Shearing Stresses in Beams. Transformations of Stress and Strain. Deflection of Beams. Elastic curves of beams for symmetrical cross-sections. Energy Methods. Theorem of virtual work. *Prerequisite: ECC206*

Objectives of the Course:

The objective of this course is to be elaborate on the knowledge of engineering mechanics (statics) and to teach the students the purpose of studying strength of materials with respect to mechanical engineering design and analysis. At the end of the Course, he will be able to do force/stress/strain/deflection analysis with different approaches. It can be bending, compression, torsion or combinations.

ME200-Workshop Training (Non-credit): This is to be completed in the Department's workshops by all ME students. Students will spend at least 80 hours (10 working days) in the workshops, and perform various hand and machine tool operations under staff supervision. At the end of the training students will be required to complete a report regarding their training.
Prerequisite: ECC222

Objectives of the Course:

The minimum time for this practice in an organization is four weeks (20 working days). The main objective is to observe a company in an original setting and answer questions on the fundamental areas of Computer Engineering and Information Science. A written report summarizing the training experience is required.

YIT102 –Yabancılar için Türkçe II (2 credits):

Bu ders zorunlu ortak bir ders olarak tüm fakültelere İngilizce olarak sunulmakta olan bir derstir. Erken Osmanlı döneminden Lozan antlaşmasına kadar olan dönem ikapsamakla birlikte, uzaktan öğretim modeli ile tasarlanmış bir derstir. *Prerequisite: YIT101*

Dersin amacı:

Türkçe okuma, yazma, dinleme,ve anlama becerileri kazanmak Seçilen/belirlenen becerileri geliştirmek

Seçilen konuların derinlemesine/detaylı bir şekilde incelemek. Belirlenen kavram/kuram/konularla ilgili öğrencilerin var olan bilgilerini geliştirmek.

THIRD YEAR

ECC304-Fluid Mechanics I (4 Credits): Introduction, Fundamental concepts, Fluid statics, Basic equations in integral Form for a control volume, Introduction to differential analysis of fluid motion, Incompressible inviscid flow, Dimensional analysis and similitude, Internal incompressible viscous flow. *Prerequisite: MTH201*

Objectives of the Course:

The students gain an understanding on the fundamental concepts of Fluid Mechanics, and the methods to solve engineering problems related to Fluid Mechanics.

ECC307-Machine Design I (4 Credits): Introduction to mechanical engineering design. Load analysis, materials, deflection and stability. Stress analysis, stress concentrations.

Strength of machine elements, theories of failure under static and dynamic loadings. Threaded fasteners, bearings riveted welded joints, springs. Lubrication and sliding bearings, rolling element bearings. Kinematics of spur gears. Design of spur gears. *Prerequisite: ECC224*

Objectives of the Course:

To teach students how to apply the concepts of stress analysis on some mechanisms such as gear, cams etc., theories of failure and material science to analyze, design and/or select commonly used machine components.

ECC317-The Principles of CAE (3 Credits):-Introduction and Principles of CAD, CAD Station/ Hardware and Software, Application of Computers in the Product Design,AutoCad and Solid Works as a design software, Fundamentals of 2D construction, Creating 2D Engineering Drawings using Auto CAD, Dimensioning and Tolerancing, Managing drawings with Layers, Representation of 3D objects, Boolean Operations (Union,Substract and Intersect), Standard Solids, Geometric Modelling(Solid Modelling) , Solid Component Assembly. *Prerequisite:*

Objectives of the Course:

To teach the principles of CAD / Solidwork and to teach/develop drawing techniques using CAD and design thinking and visualisation process in CAD, to teach the students the use of tolerances (Limits and Fits) when generating assembly/sub-assembly drawing and the areas of use for geometric tolerances and for students to gain techniques and the understanding of

Torque transfer components.

MTH323-Numerical Analysis (3 Credits): Methods for numerical solution of mathematical problems. Roots, optimization, linear algebraic equations, matrices, curve fitting, differentiation, integration, ordinary differential equations. *Prerequisite: MTH 102*

Objectives of the Course:

The course will be develop an understanding of the elements of error analysis for numerical methods and certain proofs. It also derive appropriate numerical methods to solve algebraic and transcendental equations.

ECC214-Electrical Machinery (3 Credits): Basic Electrical Elements and Circuit Fundamentals. Magnetic circuits. Ideal transformers. Three phase transformers. Application areas of transformers. DC motors and generators, AC machines and generators. Application areas of electrical machines. *Prerequisite: PHY102*

Objectives of the Course:

Conceptual overview of law and methods in engineering. Teaching Methods of Circuit theory. Teaching Power in circuits.

ECC308-Machine Design II (4 Credits): Analysis and design of machine elements. Helical, bevel and worm gears. Shafts and associated parts, keys, pins, splines, couplings, clutches, brakers and fly wheels, belts, chains, torque converters. Design project involving a mechanical component or device including all detail drawings, assembly drawings and cost analysis. *Prerequisite: ECC307*

Objectives of the Course:

Students will be able any design, calculation and select an appropriate machine elements for assembly of the device or machine.

ECC310-Control Systems (3 Credits): Introduction to automatic control. Mathematical modelling of dynamic systems. Response analysis using Laplace transform method. Transfer functions and block systems. Feedback control systems. Typical actuators and transducers. Control law. *Prerequisite: MTH MTH201*

Objective of the Course:

A control system consisting of interconnected components is designed to achieve a desired purpose. It is useful to examine examples of control systems through the course of history. Regulation keep controlled variable near a constant target value (e.g. process control: pressure, concentration etc.). • Tracking keep controlled variable near a time-varying target value (e.g. antenna positioning, robotic manipulator)

ECC314-Dynamics of Machine Systems (4 Credits): Introduction to mechanisms: basic concepts, basic types of mechanisms. Position, velocity and acceleration analysis of linkages. Gear trains. Static and dynamic force analysis of mechanisms. Critical speed of shaft, rotor

balancing. Concepts of vibrations. Response of Single-Degree-of-Freedom Systems to Initial, Harmonic and Periodic Excitation. Multi-Degree-of-Freedom Systems. **Prerequisite:** *ECC212/MTH201*

Objectives of the Course:

The theory of machines and mechanisms are an applied science that is used to understand the relationships between the elements of the system. It is also developed an analysis ability on some machining components. At the end of this course, the student will understand and appreciate the importance of vibrations in mechanical design of machine parts that operate in vibratory conditions, • be able to obtain linear vibratory models of dynamic systems with changing complexities (SDOF, MDOF), be able to write the report.

ECC316-Heat Transfer (4 Credits):Introduction, Conservation Laws, Introduction to conduction, One-dimensional steady state conduction, thermal generation, and extended surface, Two-dimensional and transient conduction, Introduction to convection, External Flow, Internal Flow, Free Convection, Boiling and Condensation, Heat Exchangers, Thermal Radiation, Absorption, reflection, and transmission, Radiation exchange, Mass Transfer.**Prerequisite:** *MTH201*

Objectives of the Course:

Provide a conceptual frame work for understanding the heat transfer through solid bodies; emphasize the importance of energy interactions at the solid-fluid boundary to temperature distribution in solids. Enhance the ability to apply the knowledge of mathematics and science to heat transfer related problems. Develop practical solutions for thermal related mechanical engineering problems under professional and ethical constraints. The student will be able to predict the flow type, calculate local and mean heat transfer coefficients at surfaces for external and internal flows and indentify the entrance length of a tube flow. The importance of thermal radiation in engineering systems is identified. Basic design methods of heat exchangers are introduced and practical solutions to heat exchanger design under professional and ethical constraints are demonstrated.

ME300-Industrial Training (Non-credit): This is a period comprising a minimum of 20 working days training to be completed in an industrial organization by all students who are effectively in their junior or senior year. Students should obtain approval of the department before commencing training. Following this training, students will be required to write a formal report and give a short presentation before a committee regarding their training.

Prerequisite: *ME200*

Objective of the Course:

The main objective is to observe a company in an original setting and answer questions on the fundamental areas of Mechanical Engineering and Mechanical Science. A written report summarizing the training experience is required.

FOURTH YEAR

ECC424-Experimental Analysis of Mechanical Engineering Systems (4 credits): The need for experiments. Experimental procedure. Generalized measurement system. Report writing. Error treatment. Uncertainty. Frequency Distribution. Expected value, standard deviation. Presentation of experimental results. Plotting data. Curve fitting, linear regression. Non-linear relationships. Dimensional analysis. Laboratory experiments.*Prerequisite: (4th year student)*

Objectives of the Course:

To teach students the type of engineering measuring instruments which are available in industry and their underlying operating principles.

To make sure that students gain hands on experience in using industrial and laboratory measuring instruments and to teach them how to set up experiments on mechanical systems and design. Students should be able to make a selection from measuring instruments depending on their accuracy limitations and the environment and be able to ask intelligent questions. To teach the students how to support the applications of basic mechanical engineering courses with experimental analysis.

MEE427-Engineering Ethics (2 Credits): This course is designed to introduce moral rights and responsibilities of engineers in relation to society, employers, colleagues and clients. Analysis of ethical and value conflict in modern engineering practice. Importance of intellectual property rights and conflicting interests. Ethical aspects in engineering design, manufacturing, and operations. Cost-benefit-risk analysis and safety and occupational hazard considerations. *Prerequisite: -*

AIT103-Principles of Atatürk and The History of Turkish Revolutions I (2 Credits):

This course is focusing on the early dynamics of the Ottoman Empire (including social, economic, political institutional and cultural) and examines the historical background of Republic of Turkey. The main aim of the course is to scrutinize the political dynamics and modernization attempts of Ottoman state analysed comprehensively. By doing so, basic concepts of History of Revolution, World and Ottoman Empire at the Beginning of the 20th Century, The Last Period of the Ottoman State, The First World War, The Preparatory Period of the National Struggle are the main topics that are focussed in the classes. It aims to let the student who attends the AİT 103 courses to acquire the ability of classification, description, explanation, analysis of the current social and individual problems in Turkey by taking rationality and science, norms of modernity into account with respect to the Kemalist thought and the Turkish Revolution. *Prerequisite:-*

Objective of the Course:

Describe/explain some understanding terms/Belirlenen kavram(ları) açıklamak/anlatmak. Create a different environments related to the understanding ability and develop them/İlgili kavram(lar)la alakalı farkındalık yaratmak ve bunu geliştirmek. Discuss the determined terms on the topics. Develop a selected and determined abilities/Seçilen/belirlenen becerileri geliştirmek. Develop for students abilities/ideas/considerations/knowledges/Seçilen

kavramlar bağlamında öğrencilerin fikirlerini/bilgilerini/kavrayışlarını geliştirmek. Encourage the new developments/Yeniliği teşvik etmek Generate the critical considerations/Eleştirel düşünceyi geliştirmek.

ME400-Graduation Project (4 Credits): The design process and morphology. Problem solving and decision making. Modelling and simulation. Use of computers in engineering design and CAD. Project engineering, planning and management. Design optimization. Economic decision making and cost evaluation. Aspects of quality. Failure analysis and reliability. Human and ecological factors in design. Case studies. A term project is assigned.
Prerequisite: (4th year student)

Objectives of the Course:

The purpose of the graduation project is to provide students with an opportunity to engage in an activity that will allow them to demonstrate their ability to apply the knowledge and skills they have gained throughout their years in the educational system.

ME450–Power Plant Training (Non-Credit): This is a period comprising a minimum of 10 working days training to be completed in a power plant by all students who are effectively in the final year. Students should obtain approval of the department before commencing training. Following this training, students will be required to write a formal report and give a short presentation before a committee regarding their training.**Prerequisite: ME300**

AIT104–Principles of Atatürk and the History of Turkish Revolution II (2 Credits) :The political, This course is focussing on the establishment of the Republic of Turkey as a secular and unitary state after the collapse of the Ottoman Empire; the history of Turkish modernization experience in accordance with the establishment of the new state, the instruction of the Turkish Revolution pioneered by Kemal Atatürk and the Kemalist thought, as the meaning and statement of modernity and secularism in Turkey to young generations and let them figure out its significance. It aims to let the student who attends the AİT 104 courses to acquire the ability of classification, description, explanation, analysis of the current social and individual problems in Turkey by taking rationality and science, norms of modernity into account with respect to the Kemalist thought and the Turkish Revolution.
Prerequisite: AIT103

Objectives of the Course:

The political, social, economical and cultural transformation in the Republic of Turkey; The six principles of Atatürk and Kemalizm; Turkish Foreign Policy during the Atatürk period.

Technical Elective Courses

ME401-Hydraulic Machinery: Introduction, Pipes. Turbopumps, Cavitation. Dimensional Analysis and Similitude for Turbomachinery, Use of Turbopumps in Piping Systems, Turbines, Pelton Wheels, Wind Turbines. *Prerequisite: ECC304*

Objectives of the Course:

To introduce theory of hydraulic machines. To teach design principles of turbines and pumps

and to use them in engineering applications. Learning Outcomes and. Competences.

Learning principles of hydraulic machines.

ME411-Heating, Ventilating, Air Conditioning and Cooling Systems: Fundamentals of local and central heating, heating elements, heat loss calculations, heating by hot water, pipe layout design. Local and central cooling, cooling elements, heat gain calculations, cooling by chilled water. Air conditioning, ventilation, heating and cooling by air, duct design. Design of central heating and cooling systems. *Prerequisite: - (ECC316recommended)*

Objectives of the Course:

To provide the necessary equipment for the design of heating, cooling, ventilation and air conditioning systems.

ME416-Solar Engineering: Sun, solar constant, radiation, spectral distribution and variation of extraterrestrial radiation, radiational properties of surfaces, solar angles, reckoning of time, radiation on horizontal and tilted surfaces, isolation on tilted surfaces, atmospheric attenuation of solar radiation, absorption of solar radiation, pyranometer, solar cells, solar plates, solar radiation data, estimation of solar radiation and clear sky radiation, beam and diffuse components of radiation, energy storage. *Prerequisite: ECC316*

Objectives of the Course:

To teach students about wind energy which is one of the renewable energy sources and to increase their knowledge regarding the necessary calculations. The objective of this course are to provide the student with the energy principles. Students will be able to discussing about solar energy operation. Students will be able to calculate the power from solar energy directly from sun or using by solar cells

ME418-Refrigeration Techniques: Application areas. Fundamentals of reversed heat engine cycles. Vapor-compression and absorption refrigeration cycles. Refrigerants. Absorption systems. Capacity control of refrigeration components. Cooling load calculations. System components: compressors, evaporators, condensers, expansion devices, piping, auxiliary and control devices. Cold storage rooms. Transportation of cooled materials. Prerequisite: ECC208

Objectives of the Course:

Introduce aspects of various natural refrigeration methods, namely: Use of ice transported from colder regions. Use of ice harvested in winter and stored in ice houses. Use of evaporative

cooling.

ME423-Heat Exchanger Design: Parallel, cross and counter flow type heat exchanger design calculations. Evaporation. Evaporator and condenser types: tube and shell, mixing types, and compact heat exchanges. Thermal stress problems of heat exchanges. Optimization of heat exchanges. Construction problems. *Prerequisite: ECC316*

ME425-Machine Tools and Tool Design: Mechanics of metal cutting. Metal cutting tools. Cutting fluids. Machine tool selection. Cutting speed, feed and depth of cutting. Turning, drilling, shaping, planing, milling and broaching. Abrasives, grinding wheels and grinding operations, Finishing operations. *Prerequisite: ECC222*

ME426-Introduction to Finite Element Method: Analysis of stress and strain. Constitutive equations. Plane problems of elasticity. The finite element concept. One-and two-dimensional finite element formulation techniques. Transformations, assembly and solution techniques. Introduction to three dimensional finite elements. Project assignments of one and two dimensional problems. *Prerequisite: ECC224 / MTH323*

ME431-Energy Conversion Systems: Energy demand and available resources in the world. Renewable sources: wind, wave, tide, geothermal, biogas and solar energy. Fossil fuels, combustion and combustion equipment. Steam generators. Atomic structure, nuclear reactions; decay, fusion and fission. Reactors. Environmental effects. *Prerequisite: ECC207*

Objective of the Courses:

This course will provide students with hands-on learning experiences as they conceive, design and implement renewable energy systems.

ME433-Mass Transfer: Fundamentals of mass transfer, principles of diffusion and diffusivity, molecular and convective mass transfer, phase equilibria, equilibrium processes, absorption, membrane separation processes, leaching, distillation, drying and crystallization, extraction, evaporation. *Prerequisite: ECC316*

ME441-Fluid Mechanics II: Flow Measurements. External incompressible viscous flow. Boundary layer theory. Potential flow theory. Turbomachinery, Introduction to compressible flow. *Prerequisite: ECC304*

Objectives of the Course:

After the completion of this course, the student will be able to develop a thorough understanding on solving problems related to incompressible and compressible flow in Fluid Mechanics and in the other fields of fluid mechanics such as hydraulic machinery.

ME442-Gas Dynamics: Introduction to Compressible flow. Flow Regimes, Integral Forms of the Conservation equation for Inviscid Flows. One-Dimensional Compressible Flow. The Speed of Sound and Mach Number. Categories of Wave Propagation in a Compressible Flow. Normal Shock Waves. One-Dimensional Flow with Heat Addition. One-Dimensional Flow with Friction. Oblique shock and expansion waves. Quasi-One-Dimensional Flow. Area- Velocity Relation. Nozzles. Diffusors. *Prerequisite: ECC304*

ME453-Materials Engineering: Engineering materials and properties. Materials selection and development. Thermal processing, specific examples. Some advanced materials. Design with brittle materials. Materials selection charts. *Prerequisite: ECC211*

Objectives of the Courses:

Develop an ability to apply the knowledge of structure↔property↔performance↔failure and processing↔structure↔property relations in engineering materials. Specific properties and applications of all classes of engineering materials. Design with brittle materials and Weibull analysis. Have a short view of materials selection approaches, materials selection charts and examples.

ME461-Hoisting and Conveying Machines: Introduction to Material Handling, forms of transportable materials, basic elements of Hoisting, Block and Tackle Mechanisms, Lifting Mechanisms, Hoist types, Overhead travelling Cranes, Gantry Cranes, Column Jib Cranes, FEM standards, Conveyors (roller, gravity, screw and belt conveyors), conveyor components, Drive power calculations. *Prerequisite: ECC212 / ECC224*

ME475-Material Failure Analysis: Phase transformations in solids. Modification of material properties via the Processing – Structure – Property route. Types of heat treatment. Heat treatment of steels. Tool steels. Heat treatment of cast irons. Heat treatment of non-ferrous metals. Heat treatment of non-metallic materials. Materials damage at elevated temperatures. *Prerequisite: ECC211*

ECC425-Internal Combustion Engines: Fundamentals of spark-ignition and compression ignition engines. Actual engine cycles. Combustion and detonation. Air capacity and super-charging. Carburetion and fuel injection. Engine friction. Heat rejection and cooling. Performance characteristics and testing. *Prerequisite: ECC208*

Objectives of the Course:

The main objective of the course is to give the students an introduction to reciprocating internal combustion engines with emphasis on marine and stationary

applications. The focus is on explaining engine performance in terms of power, energy utilization and exhaust emissions, its relation to internal system.

ECC433-Heat Treatment: Phase transformations in solids. Modification of material properties via the Processing – Structure – Property route. Types of heat treatment. Heat treatment of steels. Tool steels. Heat treatment of cast irons. Heat treatment of non-ferrous metals. Heat treatment of non-metallic materials. Materials damage at elevated temperatures. *Prerequisite: ECC211*

Objectives of the Course:

The necessary fundamentals for understanding the material properties given by the available heat treatment processes, standards and patents.

The ability to evaluate the micro-structural transformations and corresponding modifications in material properties after various thermal, thermo-mechanical and thermo-chemical treatments.

The ability to select different manufacturing technologies and heat treatments in product, device and system planning.

ECC434-Quality Control: The purpose of the course is to make an introduction and lay the foundation of modern methods of statistical quality control and improvements that are used in the manufacturing and service industries along with basic concepts of reliability. The students will first be introduced to some of the philosophies of quality control experts and their impact on quality. This course familiarizes students with quality control techniques, quality assurance issues and quality management methods. Finally basic concepts of reliability of systems will be introduced. *Prerequisite: ECC211*

Objectives of Course:

The purpose of the course is to make an introduction and lay the foundation of modern methods of statistical quality control and improvements that are used in the manufacturing and service industries along with basic concepts of reliability. The students will first be introduced to some of the philosophies of quality control experts and their impact on quality.

ECC481-Sheet Metal Processes and Mould Design: Introduction sheet metal processes: Shearing, blanking, punching operations, bending operations deep drawing operations of sheet metals. Other sheet-metal operations. Engineering analysis of these operations, design and production of sheet metal moulds, Presses and tools used for sheet metal processes. *Prerequisite: ECC222*

ECC483-Reverse Engineering Methods: Introduction. The Status and Role of Reverse Engineering. History of Reverse Engineering. The Teardown Process. Methods of Product Teardown. Failure Analysis and Forensic Engineering. Deducing or Inferring Role, Purpose, and Functionality during Reverse Engineering. The Antikythera Mechanism. Identifying Materials-of-Construction. Inferring Methods-of-Manufacture or Construction. Construction of Khufu's Pyramid: Humankind's Greatest Engineering Creation. Assessing Design Suitability. Bringing It All Together with Illustrative Examples. Value and Production Engineering. Reverse Engineering Materials and Substances. Reverse Engineering Broken, Worn, or Obsolete Parts for Remanufacture. The Law and the Ethics of Reverse Engineering. *Prerequisite:- ECC307*

Restricted Non-Technical Courses

ECC426-Economics for Engineers: Principles and economic analysis of engineering decision making. Cost concept. Economic environment. Price and demand relations. Competition. Make-versus-purchase studies. Principles and applications of money-time relations. Depreciation. Money and banking. Price changes and inflation. Business and company finance. *Prerequisite: -*

Objectives of the Course:

Discuss principles and economic analysis of decision making. Discuss cost concepts, make-versus-purchase studies; Analyze principles of money-time relationships. Work on cash flow analysis. Analyze application of money-time relations. Analyze supply and demand relations. Analyze price and demand relations. Analyze breakeven point analysis and effects of inflation on money-time relationships.

ECC427-Management for Engineers: Principles of management. Functions of managers. Organisation and environment. Marketing management. Production management. Personnel management. Managerial control. Accounting and financial reports. Budgeting and overall control. *Prerequisite: -*

Objectives of the Course:

Discuss principles of management, Discuss functions of managers, Discuss organization and environment, Discuss marketing, production and personnel management, Discuss marketing control, Discuss accounting and financial reports, Discuss budgeting and overall control,