

T.C.
BİLECİK ŞEYH EDEBALI UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING
UNDERGRADUATE COURSE CONTENTS

1st SEMESTER

ATA101 History of Ataturk's Principles and Revolutions I

The last period of the Ottoman State and reform movements; Battle of Tripoli; Balkan wars; World War I; Participation of the Ottoman State in the First World War; Mondros Armistice Agreement and the demolition of the Ottoman Empire; Mustafa Kemal Pasha's Initiation and Organizing of National Struggle in Anatolia: Mustafa Kemal Pasha's arrival in Samsun, Amasya Circular, Erzurum and Sivas Congresses; Opening of the first T.B.M.M.; Sevr Peace Treaty; Establishment of Regular Army.

ENF101 Basic Information Technology Usage

Basic information about computer systems, introduction to the computer hardware and software. WINDOWS operating systems, word processing, presentation, Spreadsheet and graphics, internet, e-mail and WWW information, HTML programs.

ENG101 English I

Basic English Grammar, Vocabulary, Reading ,Writing and Speaking skills.

FIZ101 Physics I

Physics and measurement, vectors, motion in one dimension, motion in plane and space, circular motion and miscellaneous applications of Newton's laws, work and kinetic energy, potential energy and conservation of energy, linear momentum and collisions, rotation, rolling and angular momentum, static equilibrium and elasticity, vibrations, the universal law of gravitation.

KIM103 General Chemistry

Properties and measurement of materials. Atoms and atomic concept. Chemical compounds and reactions. Stoichiometry. Introduction to reactions in aqueous solutions, gases, thermochemistry, atomic electron structure, periodic table and some atomic properties. Chemical bonds I: Basic concepts. Chemical bonds II: Bond theories and molecular structure.

MAT101 Mathematics I

Single-Variable Functions, Limits and Continuity, Applications of Derivatives,, Curve Drawing, Asymptotes, Fundamental Theorem of Integral Calculus, Applications of Definite Integrals, Polar Coordinates, Transcendental Functions, Techniques of Integration, Indeterminate Forms and L'Hopital's Rule, Improper Integrals.

MM103 Engineering Drawing

Scaling. Plane geometry-engineering constructions. Spatial geometry for design and analysis. Projection of a point. Projection of a straight line. Projection of a plane in space. Intersection of two planes. Multiview projection auxiliary views. Sectional views. Perspective projection. Dimensioning. surface view.

MM105 Introduction to Mechanical Engineering

Department Orientation, Development of Mechanical Engineering, Engineering Ethics, Library Use, Information about Internship, Introduction of Erasmus and Farabi Programs, Introduction of Department Education and Research Laboratories, Introduction of Thermodynamic Branch, Introduction of Mechanical Branch, Introduction of Materials Science Branch, Introduction of Construction and Manufacturing Branch, Introduction of Machine Theory and Dynamics Branch.

TRK101 Turkish Language I

What is language. Languages of the world. The place of Turkish in these languages and its historical development. Nowadays problems of Turkish accompanied with current texts. Analysis of an essay with scientific context. Analysis of a column. Turkish as science language presentation studies accompanied by guide texts.

2nd SEMESTER

ATA102 History of Ataturk's Principles and Revolutions II

Fronts in the War of Independence: Eastern Front, South Front, Western Front; On the Western Front Warfare Made: İnönü Wars, Eskişehir-Kütahya War, Sakarya Battle, Commander-in-Chief Battlefield; Mudanya Ceasefire Agreement; The Lausanne Peace Treaty; Establishment of Democratic Law State: Law, Education, Economy and Social Life innovations made; Ataturk's Principles: Republicanism, Nationalism, Populism, Statism, Secularism, Revolutionism, General qualities of these principles. Qualifications and Priorities. Factual Improvements. Topics related to the Treaty of Lausanne. The problem of Mosul with England. About France Relations and Hatay Problem. Population exchange with Greece and Etabli Solution. Turkey with the Soviet Union. Developed Against Rising War Tehdidine Policy. Turkey's membership to the League of Nations. Balkan Pak. Sadabat Paktı. Montreux Bosphorus Convention. Developments in internal and external politics. Between 1960 -1980 in Turkey Political and Social Developments.

MF102 Basic Computer Science and Programming Languages

FORTRAN programme language, data structure (algorithm and programming entry)

ENG102 English II

Learning reading strategies for various types of texts. Apply certain types of writing. Making grammar and vocabulary studies about the texts read. Different reading strategies use. Without disturbing and disrupting the communication, speak easily. The technical rules of writing and the structure of a written text determine the items. Extracting and rewriting a written piece. Other skill grammar rules that are integrated into the basic grammar rules and reinforce their structures. Learning by contexts and structural elements. in the course academic staff in the academic level and English speakers to follow and to participate in discussions during the course.

FIZ102 Physics II

Coulomb's law and the electric field, Gauss' law, electric potential, capacitance, Electric energy, and properties of insulators, current and resistance. Energy and current in DC circuits, the magnetic field, sources of the magnetic field, Faraday's law, inductance, magnetic fields in matter, electromagnetic oscillations and AC circuits, Maxwell's equations and electromagnetic waves.

MAT102 Mathematics II

Improper integrals. Sequences, limits, monotone sequences. Series with positive terms, series with arbitrary terms, absolute and conditional convergence, power series, Taylor and Maclaurin series. Vector calculus. Functions of multiple variables, limits, continuity, partial derivatives, chain rule, directional derivatives, maxima and minima, Lagrange multipliers, Taylor's formula. Double and triple integrals.

MIM104 Computer Aided Technical Drawing

Explanation of montage drawings, material list, bolts, shaft-hub connections and pictures, introduction to gear wheels and drawings, rules of assembly, turning motion and screw mechanisms, tolerances and passes, plumbing, welding and steel construction drawings, applications.

MM106 Statics

Statics of Particles, Rigid Bodies: Equivalent Systems of Forces, Equilibrium of Rigid Bodies, Distributed Forces: Centroids and Centers of Gravity, Analysis of Structures, Forces in Beams and Cables, Friction, Distributed Forces: Moments of Inertia, Method of Virtual Work.

TRK102 Turkish Language II

Structure of Turkish: Voice, structure and sequence properties. Text analysis (Poetry). Text analysis (Story). Practices related to narration disorders. Report, Petition and CV writing (Examples and applications). Scientific research and writing techniques. Practices for correcting language mistakes. Text studies, analysis. Oral presentation exercises.

Non-technical Elective Course I

3rd SEMESTER

ENG201 Technical English I

Introduction, Shapes, Physical Descriptions, Matter, Molecules in Motion, Acids, Bases and Salts, Wave Motion, Engineering Materials, Metals, Toricelli's Experiment, Generators and Faraday, Force, Friction.

MIM203 Strength of Materials I

Introduction, Concept of Stress, Stress and Strain - Axial Loading, Torsion, Pure Bending, Analysis and Design of Beams for Bending.

MIM204 Thermodynamic I

Basic concepts of thermodynamics. Pure substance. Work and heat. The first law of thermodynamics. State equations. Internal energy, enthalpy and specific heat. The second law of thermodynamics. Entropy.

MIM205 Materials Science

Introduction, Atomic Structure, Atomic Bonding, Crystalline Structure, Miller Indices, Crystal Defects and Diffusion in Solids, Phase Diagrams and Phase Transformations, Heat Treatment and Surface Treatments, Engineering Materials, Metals (Ferrous and Non-Ferrous), Mechanical Properties and Behaviors of Materials, Mechanical Tests, Ceramics and Glass, Polymer and Composite, Electrical, Magnetic and Optical Properties, Wear and Corrosion.

MIM210 Dynamics

Kinematics of particles. Velocity and acceleration in rectangular, cylindrical, spherical and normal and tangential coordinates. Rectilinear motion. Relative motion. Kinetics of particles. Newton's law of motion. Equation of motion. Work. Impulse. Momentum. Principle of work and energy, principle of impulse and momentum. Angular momentum, angular impulse and momentum principle. Kinetics of systems of particles. Planar kinematics of rigid bodies, instantaneous center of rotation. Planar kinetics of rigid bodies. Three-dimensional kinematics of rigid bodies. Three-dimensional kinetics of rigid bodies.

MIM402 Computer Aided Design

General information about CAD. Introduction and use of basic CAD software. Coordinate systems, workspace layout. Points and lines. Three-dimensional transformations and projections. Plane curves. Surface modeling. Solid modeling. 3D modeling techniques and applications. Drawings of various geometric shapes. Definition of curves and surfaces. Basic construction design. CAD applications in mechanical engineering.

MSG101 Occupational Health and Safety I

Occupational health and safety concepts, definitions, legal issues. Occupational health and safety services, corporate and management systems, risk management, occupational hygiene, protection policies, fire, contingency plans.

Non-technical Elective Course II

4th SEMESTER

ENG202 Technical English II

Concrete, Magnets and Magnetism, Solutions, Suspensions and Colloids, The Construction of Dams, Fossils and Oils, Fuels and Combustion, Surface Tension, Lubrication, Conductors, Semi-conductors and Insulators, Electrolysis, The Engineering Profession.

MIM202 Engineering Mathematics

Introduction, Linear Algebra: Matrix algebra, Special matrices, Systems of linear equations, Gauss Elimination, Rank of Matrices, Determinants, Cramer Method, Eigenvalue Problem, Eigenvectors, Vector Algebra: Scalar and vector products, Calculation of Arc-Length, Vector Operators: Gradient, Divergence, Curl (Rotation) Operators, Definition of Differential, Line

Integral of Work, Applications of Multiple Integrals: Area, Volume, Center of gravity, Calculation of moment of inertia, Ordinary Differential Equations, Higher Order Ordinary Differential Equations, Homogeneous and Non-homogeneous Systems of Differential Equations, General and Special Solutions, Laplace Transformation: Derivative and Integral Transformations, Solution of Ordinary Differential Equations by Laplace Transform, Fourier Analysis: Solution of Non-homogeneous Ordinary Differential Equations by Fourier Analysis, Fourier Sine and Cosine Transformations, Solution of Non-homogeneous Ordinary Differential Equations with Force Series, Frobenius Method, Solution of Partial Differential Equations by Fourier Analysis, Solution of Partial Differential Equations by Laplace Transform.

MIM206 Engineering Materials

Iron Based Materials, Iron-Carbon Equilibrium Diagrams, Heat Treatment of Steels, Surface Processes, Cast Irons, Introduction to Non-Ferrous Materials, Aluminum Alloys, Magnesium and Copper Alloys, Titanium Alloys, Structure and Properties of Polymeric, Ceramic and Composite Materials, Materials Selection and Development.

MIM208 Strength of Materials II

Shearing Stresses in Beams and Thin-Walled Members, Transformations of Stress and Strain, Principal Stresses under a Given Loading, Deflection of Beams, Columns, Energy Methods.

MIM212 Manufacturing Planning and Control

Principles of manufacturing planning and control, material resource planning (MRP), Enterprise Resource and Capacity Resource Planning (ERP-CRP), repair and maintenance planning, manufacturing planning (GANTT), Process Planning Techniques, manufacturing technologies and machining process, process planning techniques, stock control, Six Sigma, Process Planning Techniques -Statistical Process Control-SPC), Investment Planning and Control, Supply Chain Management – SCP, Project Management, Computer Integrated Manufacturing-CAD-CAM-CIM, Design for X DF-X (Manufacturing, Assembly, Recyclability, Environment - DFM, DFA etc., Rapid Prototype, Robust Design, quality techniques, new product development techniques, Design of Experiments-DOE, Taguchi Methods, Project Evolution and Review Technique-PERT, Quality Function Deployment-QFD, Failure Mode and Effects Analysis-FMEA, Affinity Diagram, (Value Analysis-VA), Critical Path Method-CPM, Flexible Manufacturing, (Benchmarking), brainstorming, Product Data Management, Cell/Cellular Manufacturing, Poka-Yoke

MIM213 Workshop

Principles of manufacturing technologies and machining process (turning, milling, boring, reaming, broaching, planing, shaping, sawing, filing, abrasive, grinding etc.), material removal processes, casting methods, forging, drawing, extrusion, molding, sheet metal forming process and using manufacturing equipment, drawing-shaping, welding, hot-cold forging or forming, plastic forming and shaping, chip forming, chip morphologies, and cutting tool properties, cutting speed, feed and feedrate, cutting and cooling conditions, inserts, tool holder and magazine, tool life, tool wear.

MIM301 Thermodynamics II

Open system analysis. Steam and gas cycles. Ideal gas mixtures. Gas-vapor mixtures. Combustion. Available energy.

MSG102 Occupational Health and Safety II

Occupational Health and Safety Committees, Organizational Structure and Duties, Identification of Hazards, Risk Management and Evaluation, Emergency Plans, Occupational Safety Analysis in Work Environments, Work Accident Protection Policies, Protective Equipment, Warning Signs, Protective Measures.

Non-technical Elective Course III

5th SEMESTER

MIM302 Fluid Mechanics

Introduction, Characterization of a Fluid, Continuum Hypothesis, No-slip Condition, Viscosity, Pressure and Fluid Statics, Manometers, Newton's Law of Viscosity, Conservation of Mass, Continuity Equation, Conservation of Momentum, Reynolds Transport Theorem, Conservation of Energy, Bernoulli Equation, Venturimeters, Pitot Tube, Navier-Stokes Equations, Inviscid Flow: Euler's Equation, Newtonian Fluids, Stream Function, Vorticity, Velocity Potential, Source-Sink, Rankine Oval, Dimensional Analysis (Buckingham Pi Theorem), Viscous Flow in Pipes, Laminar Pipe Flow, Turbulent Pipe Flow, Moody Diagram, Boundary Layer Flow, Compressible Flows, Shock Waves.

MIM303 Manufacturing Principles I

Casting Technique, Advantages of Casting Method, Solidification of Metals, Principles of Metal Casting, Casting Processes, Patterns, Core, Downsprue, Riser, Introduction of Casting Methods, Bulk Deformation Processes, Mechanical and Metallurgical Principles in Bulk Deformation Processes, Forging, Rolling, Extrusion, Sheet Metal Forming.

MIM306 Machine Elements I

Introduction, Fundamentals of Mechanical Engineering Design, Materials, Load and Stress Analysis, Shafts and Shaft Components, Bolt and Screw Joints, Welding Joints, Rivet Joints, Solder Joints, Bonding Joints, Mechanical Springs, Computer Aided Mechanical Engineering Design

MIM307 Mechanism Technique

Introduction to mechanism theory. Mechanism degree of freedom and mechanism classification. Kinematics of motion. Speed and acceleration analysis in mechanisms. Linear mechanical systems. Four-bar mechanism. Cam mechanisms.

MIM327 Numerical Methods

Introduction, Error Definitions, Roots of Equations, Bisection Method, False-Position Method, Newton-Raphson Method, Secant Method, Multiple Roots, Solutions of Systems of Linear Equations, Graphical Method, Determinants and Cramer Method, Gauss Elimination

Method, Gauss-Jordan Method, Inverse Matrix Method, Lower and Upper Triangular Matrices Separation Method, Cholesky Method, Gauss-Seidel Method, Curve Fitting, Linear Regression, Interpolation, Linear Interpolation, Quadratic Interpolation, Newton Interpolation, Lagrange Interpolation, Numerical Integration, Trapezoidal Rule, Simpson's 1/3 Rule, Numerical Differentiation, Forward Finite Differences, Backward Finite Differences, Central Finite Differences, Ordinary Differential Equations, Euler's Method, Improvements of Euler's Method, Heun's Method, Runge-Kutta Methods.

MIM200 Internship I

Technical Elective Course I

Non-technical Elective Course IV

6th SEMESTER

MIM305 Heat Transfer

Introduction, Conservation of Energy, Introduction to Conduction, One Dimensional, Steady-State Conduction, Heat Transfer from Extended Surfaces, Two Dimensional, Steady-State Conduction, Transient Conduction, Introduction to Convection, External Flow, Internal Flow, Free Convection, Radiation: Processes and Properties.

MIM308 Computer Aided Manufacturing (CAM)

Machine tools and automation, CAD-CAM Systems, computer integrated manufacturing, group technologies, CNC Machine and CNC programming (ISO G Code, coordinat systems, CNC control types, chip forming, chip morphologies, and cutting tool properties, cutting speed, feed and feedrate, cutting and cooling conditions, inserts, tool holder and magazine, tool life, tool wear, simulation programs, CNC programming, Manufacturing and Control programming and control units (Siemens, Fanuc, Heidenhain etc.)

MIM326 Manufacturing Principles II

Machining Processes and Technology, Abrasive and Non-Traditional Machining Processes, Welding Technology, Welding Metallurgy, Powder Metallurgy, Heat Treatment Types

MIM328 Machine Theory and Dynamics

Temel tanım ve kavramlar. Mekanizma ve makinenin tanımları. Mekanizmaların sistematik analizi. Mafsal ve mekanizmaların serbestlik dereceleri. Grübler Kriteri. Hacimsel ve düzlemsel mekanizmalar. Çubuk (kol) mekanizmaları. Düzlemsel mekanizmalarda kinematik analiz metotları. Vektörler metodu, kompleks sayılar metodu. Kam mekanizmaları. Hareket kanunları. Dişli mekanizmaları. Basit ve planet dişli sistemleri. Düzlemsel mekanizmaların sentezi. Dört çubuk mekanizmasında iki ve üç konum sentezi. Denge problemleri. Çeşitli yüklemeler altında bir uzvun dengesinin incelenmesi. Virtüel işler ilkesi. Süperpozisyon ilkesiyle denge ve kuvvet analizi. Dinamik denge kavramı. D'Alanbert ilkesi. Sürtünmeli mafsalı olan mekanizmaların statik ve dinamik denge analizi. Virtüel güçler ilkesi. Dinamiğin birinci ve ikinci esas problemleri. Makinelerde kütle dengelemesi. Enerji dengelemesi ve volan hesapları

MIM330 Automatic control

Giriş, Laplace Dönüşümleri, Sistem Dinamiği, Transfer Fonksiyonu, Matematik Modeller, Geçici Rejim Cevabı, Kontrol Elemanları, Kapalı Çevrimli Kontrol, Kararlılık, Frekans Cevabı.

MIM250 Internship II
Technical Elective Course II
Non-technical Elective Course V

7th SEMESTER

MIM331 Experimental Methods in Engineering I
Saturation Press, Metallography, Tensile-Impact, Notch-Impact, Corrosion, Bernoulli, CNC-Turning, Composite Convection and Radiation, Welding Technique Experiments.

MIM401 Design Project
Preparation for MIM404 Graduation Project by literature review and etc.

MIM300 Internship III
Technical Elective Course III
Non-technical Elective Course VI

8th SEMESTER

MIM334 Experimental Methods in Engineering II
Energy loss in pipes and elbows, CNC-Milling, 3-Point Bending, V-bending, Time-dependent heat production, Motor test, Vibration, Construction of linear heat conduction experiments.

MIM404 Graduation Project
It is a study conducted using a systematic knowledge of the lessons in the instructional plan and supporting the attainment of the desired professional level and documenting this level. One of the various proposals proposed for the department's lecturers is conducted under the supervision of the advisor lecturer. Theoretical and/or experimental studies are carried out according to the sources given. In the literature survey section of the study, it is necessary to make use of a sufficient number of sources, preferably articles. The details are presented in written form to the faculty. The dissertation is open to the academic staff in the department and the exam is held by the relevant department.

MIM300 Internship IV
Technical Elective Course IV
Non-technical Elective Course VII

TECHNICAL ELECTIVE COURSE I

MIM309 Professional English I

Introduction, sentence comprehension, passage reading and translation, how to write a general paragraph, how to write an essay on engineering, examples of a correctly prepared graph and table, explanation of results, making a presentation on engineering topics, translations from English to Turkish, translations from Turkish to English.

MIM315 Digital Measurement and Control

Introduction; Static characterization; Dynamic characterization; Selection criteria; Computer and Data Collection; A/D, D/A, Amplifier; Data acquisition system; Measurement methods and measurement elements; Temperature sensors (Thermocouples); Resistance strain gauge; Converters; Stepping motors.

MIM316 Quality Engineering

The meaning of quality control and its place of production; quality control requirement; quality control and quality assurance concept; Turkey's position in the world and quality control procedures; the main quality assessment methods; statistics quality control; Total quality Management; quality design; application quality; quality function spread (QFD); acceptance-rejection samples; control schemes; statistical process control; comparison; possible error types and effects analysis (FMEA), reliability.

MIM317 Maintenance and Repair in Production

The importance of maintenance and repair in production; inspection of the effects of maintenance and repair on production losses; Principles for the preparation of periodic maintenance plans for machinery, tools and equipment used in production; maintenance and repair costs; principles of ordering machine spare parts used in production; replacement part design; Types of care; Main factors considered in maintenance repair planning; Preventive care system and design; Relationships between maintenance repair subsystem and other subsystems.

MIM325 Corrosion and Surface Protection

Definition and importance of corrosion, Types of corrosion, Uniform, Galvanic, Crevice, Cavity, Pitting, Intergranular, Selective, Erosion, and Stress corrosion, Damages of hydrogen, Corrosion protection methods, surface protection and surface cleaning, classification of surface coating methods, Paintings.

MM315 Measurement Techniques

Description of measurement, length measurements, Vernier calipers, micrometers and dial indicators. Basic principles of electrical and mechanic measurement. Calibration, Measurement errors, System response, Periodic time and Damping, Advantages of electronic. Flatness Testing, Assessment of Surface Finish, Strain (Stress) Measurement, Measurement of Time, Speed, Acceleration and Frequency, Measurement of Force, Pressure, Torque and Power.

MIM333 Photovoltaic Technology

TECHNICAL ELECTIVE COURSE II

MIM318 Metal Cutting

The place of chip removal in production; basic manufacturing processes and the course of historical development; Structure of metals; deformation and fracture; Chip formation and types; Distinguishing features of the chip removal process; Principles of chip removal; chip mechanics; Friction and heat in chip removal; Tool wear and life; conditions affecting tool life; Tool materials; Cutting fluids; Surface roughness; Economic chip removal and optimization; Controlling the chip.

MIM319 Steam Boilers

Thermodynamic information. Construction of steam boilers. Boilers with flame-smoke pipes. Water pipe boilers. Special steam boilers. Casting boilers. Fluid bed boilers. Auxiliary elements of steam boilers, heaters, water heaters, blowers, hob and combustion systems, measuring and control systems. Calculation of burning elements, combustion, control of burning, calculations of boiler efficiency, calculations of furnace temperature, calculation of heating surfaces, heat transfer with convection and radiation, load loss, boiler accounts.

MIM322 Heating and Ventilation

Heating systems. Central heating elements. Central and regional heating. Heat transfer and heat insulation in buildings. Heat loss account. Pipe account. Heating installations in high buildings.

MIM329 Hydraulic Machines

Introduction, Similarity Correlations: Geometric, Kinematic and Dynamic Similarities, Hydraulic Turbines: Pelton, Francis, Kaplan, Ventilators: Radial, Axial, Dimensionless Characteristics Numbers: Pressure, Throttle, Speed, Power Numbers, Euler Equality, Pumps, Characteristic Curves in Pumps, Cavitation, Cavitation-resistant materials, Protection Methods from Cavitation, NPSH (Net Positive Suction Head), Design of Pump, Drawing of Turbine Blade, Design of Scroll Case.

MIM332 Measurement Techniques

Description of measurement, length measurements, Vernier calipers, micrometers and dial indicators. Basic principles of electrical and mechanic measurement. Calibration, Measurement errors, System response, Periodic time and Damping, Advantages of electronic. Flatness Testing, Assessment of Surface Finish, Strain (Stress) Measurement, Measurement of Time, Speed, Acceleration and Frequency, Measurement of Force, Pressure, Torque and Power.

MIM324 Material Inspection Methods

TECHNICAL ELECTIVE COURSE III

MIM405 Machine Tools

Turning and milling, Lathes and lathe operations, boring, drilling, reaming, broaching, sawing, filing, tapping, Machine tools and automation, material removal processes, using manufacturing equipment, chip forming, chip morphologies, and cutting tool properties, cutting speed, feed and feedrate, cutting and cooling conditions, inserts, tool holder and

magazine, tool life, tool wear, high speed machining, gear manufacturing by machining, machine parts productions, metal mold manufacturing or machining.

MIM407 Thermal Turbomachinery

General definitions, dimensional analysis, compressible and incompressible flow, performance characteristics. Radial compressors and turbines: basic theory and characteristics, one-two and three dimensional flow, energy losses, basic design parameters, strain and vibration analysis. Axial flow compressors, turbines and fans: basic theory and characteristics, design parameters, one-two and three dimensional flow, blade profiles and dimensions, energy losses, stresses and vibrations. Thermal power plants.

MIM409 Non-Destructive Inspection Methods

Introducing non-destructive experiments; Comparing non-destructive experiments with destructive experiments; Classification of non-destructive experiments; Radiography experiment; Radioscopy experiment; Gammagrafi experiment; Ultrasonic test; Magnetic dust test; Vortex flow test; Penetrant fluid test; Thermal experiments; X-ray diffraction experiment; Spectrographic experiment; Industrial radiography.

MIM410 Internal Combustion Engines

Classification of power machines and internal combustion engines, some related general definitions and concepts, theoretical engine cycles, flame and burning velocity concepts, charge induction and volumetric efficiency, combustion in IC engines, actual engine, efficiency definitions, expressions for engine power, gasoline engine detonation, gasoline engine combustion chambers, engine characteristics, engine performance curves, energy distribution in IC engines, engine tests, fuels, diesel engines, diesel engine combustion chambers, two stroke engines, supercharging, carburettors, gasoline injection systems, diesel engine fuel injection systems, ignition systems, lubrication system, cooling system.

MIM411 Fuels and Combustion

The subjects related to this course are as follows: Solid, liquid and gas fuels, chemical formulae of fuels and combustion equations, calculation of exhaust gas components, combustion and environmental pollution, calculation of flame temperature, combustion efficiency, burners and their practical applications.

MIM413 Renewable Energy Sources

Introduction, classification, solar energy, biomass, hydroelectric energy, tidal energy, wind energy, wave energy and geothermal energy and their technical, economic and environmental factors and integration.

MIM417 Automation in Production

Introduction to automation technologies. Industrial control systems. Sensors, motors and other control systems. Numerical control. Industrial robotics. Pneumatic systems and control, Hydraulic systems and control, servo mechanisms, programmable logical controller (PLC) and computer control, automation of transport systems, storage systems, automatic data reading, transmission and evaluation.

MIM419 Thermal System Design

Heat transfer equations, heat conduction, heat conduction, heat conduction in multi-base wall, one dimensional heat conduction in the conduit, critical diameter in conduits, heat exchangers, projecting and capacity determination in heat exchangers, average logarithmic temperature difference method, transfer unit cooling method, cooling cycles, two evaporator cooling cycles with two compressors, two evaporator cooling cycles with two compressors, psigrometric analysis, summer air conditioner, air conditioning units, determination of cooling load in air conditioning systems, determination of air conditions and determination of air flow.

MIM427 Mechanical Vibration

Basic concepts. Undamped, damped and forced vibrations of single degree of freedom systems. Vibration measuring instruments. Vibration isolation. Vibrations of two degree of freedom systems. Dynamic vibration absorber. Free and forced vibrations of multi-degree-of-freedom systems. Methods in natural frequency calculation. Modal analysis. Rotordynamics and frequency of the rotor.

MIM431 Heat Exchangers

Essential heat and flow concepts. Parallel flow. Cross Flow. Couter flow. Mean Logaritmic Temperature Difference method. Effectiviness-NTU method. Heat exchanger types and calculations. Application project.

MIM437 Structural Analysis Applications I

Introduction to Finite Element Method, Data Determination using Finite Element Analysis, General Information about Finite Element Analysis Program will be used for Modeling, Setting Finite Element Model, Determination and Definition of Material Parameters and Boundary Conditions, Determination of Loading Conditions and Analaysis Type, Solution of The Problem using Solution Criterion.

MIM429 Introduction to Robotics

Basic concepts of robotics. Kinematic and dynamic analysis of the robots. Classification of robots, Robot kinematics. Robot dynamics. Rotation movements. Homogeneous transformations. Inverse kinematic transformations. Trajectory planning. Lagrange equations. Control of robots. Robot sensors. Robot applications.

MIM421 Introduction to Composite Materials

MIM423 Non-Ferrous Materials

MIM425 Hydraulic-Pneumatic Systems

MIM435 Energy Efficiency and Management

TECHNICAL ELECTIVE COURSE III

MIM321 Natural Gas Installation

Essential concepts and identifications for natural gas installation. Equipments of natural gas installations. Projecting the conversion of indoor installation and boiler room installation for residenttter. To get ability to prepare a building installation project.

MIM406 Plastic Forming

Structure of plastic materials. Classification of plastics and their general properties (thermoplastics, elastomers, duroplasts). Processes in the plastic industry are factors to consider in construction with plastic materials.

MIM410 Internal Combustion Engines

Classification of power machines and internal combustion engines, some related general definitions and concepts, theoretical engine cycles, flame and burning velocity concepts, charge induction and volumetric efficiency, combustion in IC engines, actual engine, efficiency definitions, expressions for engine power, gasoline engine detonation, gasoline engine combustion chambers, engine characteristics, engine performance curves, energy distribution in IC engines, engine tests, fuels, diesel engines, diesel engine combustion chambers, two stroke engines, supercharging, carburetors, gasoline injection systems, diesel engine fuel injection systems, ignition systems, lubrication system, cooling system

MIM416 Modern/Advanced Manufacturing Methods

Principles of modern-advanced manufacturing methods and technologies, material selection, modern manufacturing process and process parameters, economical factors, abrasive manufacturing, waterjet and abrasive waterjet cutting-machining-manufacturing, laser beam, Electro discharge machining, ultrasound cutting, mould manufacturing, injection moulding, and extrusion, hydroforming, welding (arc welding, argon welding, stear welding, die welding), plasma cutting, electro-magnetic metal cutting-manufacturing, electrical discharge machining, electrochemical machining and grinding, ion beam machining.

MIM430 Introduction to Mechatronic

Mechatronic systems. Units and measurement. Basic physics (Force, Motion, Work, Energy etc.) Basic electronics (Resistance, Capacitor, Coil, etc.). Motors. Classification of motors. AC motors. DC motors. Servo motor structure. Sensors. (Capacitive, Inductive, Optical, etc.). Transducers, digital signals, digital logic. Hydraulic and pneumatic systems.

MIM440 Introduction to Computational Fluid Dynamics (CFD)

Introduction, What is HAD, Basic Concepts of Fluid Dynamics, Introduction to Numerical Methods, Components of Solution Methods: Mathematical model, Discretization method, Initial and boundary conditions, Solution method and convergence, Discretization Methods: Finite Difference Method, Finite Volume Method, Finite Element Method, Application of Boundary Conditions, Creation of System of Linear Equations, Solution of System Linear Equations: Gauss Elimination, LU Decomposition, Gauss - Siedel Method, Cholesky Decomposition, Thomas Algorithm, Convergence Criteria, Error Analysis and Mesh Quality Control.

MIM444 Structural Analysis Applications II

Basic Informations about Finite Element Method and General Information Finite Element Analysis Program will be used for Modeling, Basic Mechanical Problems Encountered in Industry, Analyses related to Industrial Applications.

MIM422 Mechanical Behavior of Materials

MIM424 Heat Treatment

MIM426 Welding Technology

MIM428 Material Selection
MIM432 Introduction to Finite Element Method
MIM434 Molding Technique
MIM436 Cooling Technology
MIM438 Heat Pump Systems and Applications
MIM442 Lean Manufacturing