

# 1.SEMESTER

## ATA121 Atatürk's Principles and The History of Turkish Renovation I

General condition of the Ottoman Empire; General appearances of main European states before World War I; Relationship with Turkey and Europe in 1911-1913; World War I, the position of the Ottoman Empire in World War I, fronts; Fronts, Dardanells Wars and its effects, partition plans on Empire during the World War I; Brest-Litowsk Treaty, principles of Wilson, other treaties with Bulgaria, Ottoman Empire, Germany and Austurian-Hungary states; Peace Summit in Paris, end of the World War I, economical condition of Ottoman Empire and laborer movements Mondros Armistice, minorities, the state of Ottoman army, cabinets, occupation of Smyrna; The beginning of the new period and Mustafa Kemal Atatürk, congresses, national assembly in Ankara; Fronts in independency wars, economical resources; Abrogation of regency, Lousanne Treaty and its importance, National Economic Congress, the foundation of parties, the announcement of Republic; The acceptance of secular law, social and cultural reforms, economical improvements, secular education and science; Principles of Atatürk and Turkish Republic, its content and concept

## FZK171 Physics I

Physics, pure sciences, experiments and measurement concept, Motion in One Dimension, Vectors and Motion in Two Dimension,, Circular Motion, Motion Laws and Other Applications of Newton's Laws and friction, Review , exercises and problem solving approaches, Work, Kinetic energy and Power , Potential Energy and conservation of Energy, Linear Momentum and Collisions, Rotation of a Rigid Object and Angular Momentum, Universal Gravitation, Static Equilibrium and Elasticity, Fluid Mechanics, General Review and problem solving

## KMY120 Chemistry

Subject of chemistry, Nomenclature, Atom and its structure, Periodic table, Mol and Chemical Problems, Chemical Bonds, Gases, Liquids, Solids, Mixtures, Acids, Bases, Chemical Kinetic and Equilibrium, Thermodynamic.

## MAT185 Calculus I

Function, Trigometric, logarithm and exponential function, inverse function Hyperbolic function. Limit definition, one sided limit, l,imit properties, continuity, infinite limits, derivatives definition, derivative of function, implicit differentiation, application of derivatives, chain rule, coomon graphs, introduction to integration.

## MAT187 Linear Algebra

Linear equation systems, Matrices, Vector Spaces, Linear Transformations, Determints, Eigen vectors and eigen values, Orthogonal, Gram-schmidth othogonalization

## MLM101 Applications of Materials Technology I

introduction of design and technology projects and applications, Introduction of marking, Definition of measurement and control, Introduction to machining and manufacturing processes chipless

## TRD121 Turkish Language I

Definition and characteristics of language; the place of Turkish among other worldly languages; historical development, correct usage, structure and grammar rules of Turkish language. Definition of language. Language, thinking and emotion relationships. Language-culture relationship: What is culture? Components and its specifications which constitute the culture. Changes in the culture.

Language and society relationship. Languages of the World. The role of the Turkish language among the World languages. Development of the Turkish language and its historical periods. Turkish dialects and accents. Verbal language and written language. The present situation of Turkish language its scope. An applied study on a text of any Turkish dialect or a comparative work on the texts of dialects. Spelling rules. Punctuation marks. Derivatives. Discussion and evaluation of examination papers. Discussion on a random issue. The ways to determine the verbal equivalents of concepts (derivation, combination etc.). Verbal and written expression. Qualities of a good expression. Observation, thinking, reading, good usage of parent language. Speech deficiencies. Stress in Turkish: stress on words, stress on groups, stress on sentences. Conversation, public speaking, meetings. Written expressions: Sentence, paragraph. Types of narration: to narrate, explanation, description, etc. Incoherent expressions (Mistakes in Turkish language exam and composition papers and other incoherent expression examples which were determined on television, journals and in the Media. Phrasal expressions: Proverbs and idioms (Form and concept specifications). Interlinguistic exchange: Historical relationships of Turkish language, the channel of the exchange among languages, types of adaptations.

### **YDZI122 English II**

Past simple tense, count and uncount nouns, comparatives and superlatives, present continuous tense, going to, question forms, present perfect tense, ever and never, just and yet, present perfect and simple past tense

## **2.SEMESTER**

### **ATA122 Ataturk's Principles and The History of Turkish Renovation II**

Turkish revolution and basic characteristics of Turkish revolution; The other revolutions that effected Turkish revolution; The aim of Turkish revolution: Democratic Law State; Establishment of secular Turkish secular law system; Establishment of Turkish secular education system Reconstruction of Turkish economy, national economic and globalization; Novelties that made the Turkish society contemporary General quality of Kemalist principles and republicanism; Nationalism; Etatism and Populism; Secularism; Revolutionism; Criticisms against Kemalist ideology and answers to them

### **BLM110 Using Fundamentals of Information Technologies**

This lesson introduces students to a well-rounded approach to computer literacy that includes basic computer concepts, software applications keyboarding/word processing review, spreadsheets and presentation .

### **FZK172 Physics II**

- 1-Electrical charge and Coulomb's law
- 2-Electrical fields
- 3-Gauss's law
- 4-Electric potential
- 5-Capacitors and Dielectrics
- 6-Current, resistance and electromotive force
- 7-Simple direct currnt circuits and application of Ohm's anf Kirchoft's laws
- 8-Magnetic field and magnetic forces
- 9-Soueces of Magnetic fields
- 10-Electromagnetic induction and Faraday's law
- 11-Inductance
- 12-Magnetic propeption of matter

13-Alternating current

14-Simple alternating current circuits

### **MAM120 Technical Drawing**

Information about tools of manufacture drawing

Definition and project of Manufacture drawing

Classification of Manufacture drawing

Information relating to Manufacture drawing. Drawing tools, drawing paper, writing of norm, line class

Ancillary information : line, angle, circle, arc, tangent

Polygon drawing

General information about projection systems.perspective and drawing technics

Drawing steps of Manufacture drawing.General appearance: Explanation of the first steps

Explanation of intersection General appearance and drawing

Explanation of Dimension, geometric tolerance

Explanation of Dimension, geometric tolerance

Introduction of surface processing

Explanation of headline

All steps inclusive application

### **MAT186 Calculus II**

Indefinite integrals, computing indefinite integral, substitution rule for indefinite integral, average value function, area between curves, arc length of function volume revolution( method of ring and method of cylinder) , generalized integration, series and sequences, vector calculation vector arithmetic, multiple integration, double integration, triple integration.

### **MLM100 Introduction to Materials Science**

Introduction to Metallurgical and Materials engineering, work areas, identification and classification of engineering materials, atomic structure, bonds between atoms, atomic defects, the atomic layout, and use of phase diagrams, diffusion, and applications, structured metallic materials, polymeric materials, ceramic materials, and the determination of the deformation materials, thermal, electrical and optical properties, the material production processes.

### **MLM102 Applications of Materials Technology II**

Generally providing information about manufacture process and chipless machining

Introduction of lathe, moulder, vanele and grinding processes

Identification to machining and classified manufacture process of machining

Summarily providing information about destructive and non-destructive treatments

Describing the importance of new development innovation equipments and apparatus on chipless machining

Giving information about rolling, forging and pressing processes

### **TRD122 Turkish Language II**

Types of oral and narrative expressions; methods of scientific research.Subject, aim, theme, plan.

Writing a request.Report, essay.Column, article, critic, presentation.Letter, diary.Autobiography,

ography.Travel log, conversation, interview, speech.Discussion about examination papers, evaluation of replies. Discussion on a random issue.Theatre, tale, poem.Story, novel.Conference,

declaration, report, research paper. Scientific research methods: book, the usage of library and computer, reading, note taking. Formatting a book: Front cover, acknowledgements, inside cover, abbreviations, etc. Types, forms and rules of bibliographies. Footnotes.

### **YDZ122 English II**

Past simple tense, count and uncount nouns, comparatives and superlatives, present continuous tense, going to, question forms, present perfect tense, ever and never, just and yet, present perfect and simple past tense

## **3. SEMESTER**

### **MAM104 Mechanics I**

Vectors and forces. Resultant of plane force systems. Balance of plane force systems. Frames and cables. Friction. Centre of weight. Kinematics of physical points. Kinematics of a moving solid body. Inertia moments of areas. Mass inertia moments. Work and energy. Impuls and momentum.

### **MAT285 Differential Equations**

Introduction to differential equations, relation with engineering sciences, general and special solution, First order differential equations, separable and homogeneous differential equations, Homogenized differential equations, Linear differential equations, Bernoulli differential equations, Exact differential equations, integrating factor, Second and high order differential equations, constant-coefficient homogeneous differential equations, Non-homogeneous constant-coefficient differential equations, Cauchy-Euler differential equations, Solution of variable -coefficient differential equations by series, Bessel differential equations

### **TF150 Work Health and Safety**

General definitions about workplace safety and health, relationship with an employee, definitions of workplace, to inform aim of workplace and health, right of worker, workplace injuries and laws.

### **MLM201 Applications of Materials Technology III**

International Steel Standards.

Welding methods

Metal Forming Methods;

Fundamental Properties of Metals

Stress-Strain Relations; Normal stress, Shear stress.

Types of Strain, Tensile and Compressive Strain.

The Effect of Cold forming on Materials Properties.

Deformation of Materials, Elastic and Plastic Deformation.

Forging Method.

Forging Manufacturing Process and Differences with Other Manufacturing Methods

Forging Machine Tool and Equipment Used in Manufacturing Methods

Forging Materials Used in Manufacturing Method.

### **MLM205 Materials Science I**

Atomic Structure , Atomic Structure and arrangements, Model types of atomic bonding, The Crystal Structure of Metals, Lattice Planes and Directions, Unit cell, Atomic density, Lattice Defects , Point Defects (Zero-Dimensional), Line Defects (Dislocations; One-Dimensional) , Planar Defects (Two-Dimensional) , Volume Defects (Three-Dimensional), Microstructures, Grain size and its determination, Diffusion Mechanisms in Industrial processes Systems, Phase diagrams, Gibbs phase

rules, Alloys and Hume-Rothery rules, Iron-iron carbide equilibrium diagrams, Phases quantities and Phases components, Ternary phase diagrams.

#### **MLM207 Thermodynamics of Materials**

Thermodynamic concepts, laws, enthalpy, entropy, free energy, equilibrium cases, phase rule, Ellingham diagrams.

#### **MLM209 Total Quality Management**

Quality Function Deployment, Principles of TOM, Philosophy of TQM, Design of Experiments

## **4. SEMESTER**

#### **ELM206 Electrotechnic**

Resistors connected in various ways have equivalents, DA circuits, solution methods, energy, power, maximum power theorem, current and voltage measurement. Single-phase AC circuit elements in the definition and measurement techniques are described. Diode, thyristor, triac, and containing operational amplifiers are electronic information.

#### **MAM210 Heat and Mass Transfer**

Generalized conservation equation. Heat, mass and momentum transfer between the simulation. Basic laws of transport phenomena. Basic concepts and definitions of mass migration. Case of concentration with and without chemical reaction and temperature distributions of one-dimensional transfer. Time-dependent, two-or three-dimensional transport phenomena, exact and approximate solutions. Turbulent flow. Natural convection phenomena.

#### **MAT286 Numerical Analysis**

Solving systems of linear equations, Cramer's rule, Jacobi iteration, Gauss-Seidel method, Over-relaxation method, Gauss-Jordan and Gauss-Elimination methods, Solving systems of non-linear equations, Cramer's rule, Secant method, Newton-Raphson method, computer applications, Interpolation and extrapolation, linear interpolation, extrapolation using Taylor series, extrapolation with divided differences, Lagrange interpolation, Least squares approximations of power series, quadratic least square, exponentially weighted least square, trigonometric approximation of least square, computer applications, Numerical differentiation, numerical partial differentiation, Taylor series method and error analysis, numerical differentiation with divided differences, Lagrangian numerical differentiation, Numerical integration, rectangle rule, trapezoid rule, Simpson's 1/3 and 3/8 rules, computer applications, Multi-dimensional integrals, Romberg rule of integration, computer applications, Fourier series, Fourier coefficients, Fourier series of odd and even functions, Ordinary differential equations, Initial value problems, Euler method, Taylor series method, Runge-kutta method, Boundary value problems, shooting method, finite difference method, partial-differential equations, Numerical solution of elliptic partial-differential equations (Laplace's Equation)

#### **MLM202 Applications of Materials Technology IV**

This course is given to students for introducing milling and turning machines and their attachments, learning shaping by chip removal, learning which procedure can be applied to which machine, machine applications with necessary calculations made.

### **MLM204 Strength of Materials**

Introduction; External loads on structures; Support types of structures and reaction forces; Internal forces: Section method; Stress: Normal, shear ve bearing stresses; Strain: Hooke's law and modulus of elasticity, Deflections of axially loaded bars, Strain measurement and strain gages; Stress transformations: Mohr circle; Statically indeterminate problems; Stresses in thin-walled pressure vessels, Moments of areas: First moment of an area, Second moment of an area (Moment of inertia); Internal shear force, Normal force and bending moment in beams; Shear force and bending moment diagrams; Torsion; Stresses in beams; Deflections of beams and elastic curve; Composite beams; Statically indeterminate beams.

### **MLM206 Materials Science II**

Historical development of material and metallurgical sciences, Different using area of materials, Solidification and Solidification defects, Unbalanced solidification and segregations, Deformation hardening and cold working, Growth kinetics of phases, TTT (Time, Temperature, Transformation) diagrams, Three three stages in the annealing process which Recovery, Recrystallization and Grain growth, Dispersion hardening, Aging and Precipitation hardening, Introduction to Steels and their areas of use (Stainless steels, Tool steels, Automat steels(Free cutting steels), Tempered steels, Spring steels, Sementation steels(Case hardening steels), Nitriding steels, Structural steels, Special steels), Cast iron (Gray cast irons, Malleable cast irons, Spheroidal graphite cast irons, White and high-alloy cast irons)

### **MLM208 Non-Destructive Testing Methods of Materials**

The importance of Non Destructive Testing and its application fields, Determination of Materials Defects by using Non Destructive Testing, Materials Discontinuities formed during Manufacturing Processes and Application, Classification of Non Destructive Testing used in Applications, Radiographic Method, Ultrasonic Method, Eddy Current Method, Magnetic Particle and Liquid Penetrate Method

## **5.SEMESTER**

### **IST345 Statistics for Engineers**

Verilerin sınıflandırılması ve analiz edilmesi, olasılık teorisine giriş, temel istatistik terimlerinin örneklerle açıklanması

### **MAM203 Fluid Mechanics**

The general concepts of the fluid. Fluids. Bernoulli's equation and applications. System and control volume, mass, momentum and energy conservation equations. Navier-Stokes equations. Dimensional analysis and similarity. Flow in pipes and channels. Laminar and turbulent boundary layer. Pipe friction losses and terrestrial. Flow and pressure measurements.

### **MAM311 Computer Aided Design (CAD)**

Characteristics of computer-aided drawing programs, coordinate systems are introduced, the CAD program, examine the structure of the system, menu selections, and object, line, circle, arc, ellipse, polygon drawings, dimensioning, screening, identification layer, zoom, scale, mirror, copy, move , delete, format, copy the pattern matrix and as easy as drawing methods. 2D necessary for the technical drawings are drawn and printed on the computer commands. 2D technical drawing applications. Three-dimensional modeling methods and properties, wireframe modeling, surface modeling and solid modeling, solid model extraction appearance. Coating of the models. Model, the

addition of standard machine elements. Creating solid models and assembly. Different CAD models using a standard data structure conversion, applications of various types of machine systems modeling.

### **MLM300 Internship 1**

Summer practice of at least 36 working days preferably carried out in a plant that will involve processing of materials in an integrated manner. Report prepared at the end of summer practice should reflect both the practical experience and the knowledge gained in the second year courses.

### **MLM301 Applications of Materials Technology V**

Introduction to polymeric materials, Classification of polymers, Polymerisation and copolymerisation, Structure of the polymers and chemical bonding, Amorphous and Crystal Structure of polymers, Melting and glass transition temperature of polymers, Physical and chemical modifications of polymers, Using additive materials in polymers, Thermal and physical properties, of polymers Mechanical properties, Production Methods of Polymers.

### **MLM303 Destructive Testing Methods of Materials**

The classify for materials testing methods, The difference between destructive and nondestructive testing methods, Hardness testing of materials (Brinell, Rockwell, Macro Vickers, Macro Knoop and Micro Vickers and Knoop), Tensile test, Tensile test problems and their solving, Compression test, Bend and fold tests, Fatigue test, Fatigue test problems and their solving, Creep test, Creep test problems and their solving, Impact test and Impact test problems and their solving.

### **MLM-TS 1,2 Technical Optional Course - 1-2**

## **6.SEMESTER**

### **IKT344 Engineering Economy**

Financial accounting principles and cost systems, interpretation and use of accounting reports and supplemental information for engineering economic analyses, consideration of cost-volume-profit analyses, use of discounted cash flow techniques, flexible budgeting, transfer pricing, and capital budgeting

### **MAM301 Machine Elements I**

Fundamentals of machine elements, Strength Analysis, Shafts and Axels, Shaft-Hub connections, Keys, Fasteners, Welded joints, Springs

### **MLM302 Applications of Materials Technology VI**

Creep. Creep tests and creep curves. Creep fracture. Creep activation energy. Determinations of long term high temperature properties. Creep mechanisms. Dislocation creep. Creep distribution. Deformation mechanism maps. Creep in polymers. Creep in ceramics. Design of creep resistant materials. Fatigue and rolling tests under high temperature.

### **MLM304 Phase Diagrams**

Gibbs phase rule, single-component systems, the temperature-pressure diagrams and the cooling curves, two-component systems, the first and second rules, a eutectic, peritectic, monotektoid, Monotectic systems, solid-state transformations, alloy structure, and a solid solution compound

types Tammann diagrams, cooling curves of binary systems, three-component systems, the triangle diagram, isothermal sections, content sections, triple systems, cooling curves

#### **MLM306 Mechanical Behaviour of Materials**

Basic concepts, Stress-Strain Behavior, Elastic deformation and plastic deformation, stress-strain analysis, mechanical behavior of metals, mechanical behavior of polymers, mechanical behavior of composites, ceramics composite behavior, hardness, fracture, fatigue, creep, wear, methods of increasing strength, mechanical properties of nanostructured materials

#### **MLM -S3,4 Technical Optional Course - 3-4**

## **7.SEMESTER**

#### **MLM400 Internship 2**

Summer practice of at least 36 working days carried out in an establishment suitable with option courses followed in the third year. A comprehensive report is required which will combine the knowledge gained in the third year courses with the practical experience gained by the student.

#### **MLM401 Work placement Training**

Students who have completed three years of their academic program to participate in the Engineering Internship Program. Students work a semester along as internship in an industrial or other engineering setting, beginning at the beginning of the fourth year, and then return to university to complete their final year of studies.

#### **MLM497 Graduation Project I**

Each student will study about subject that determined with lecturers at material department. Bs.C thesis will be determined, literature survey will be searched, and contents of thesis will be written. Finally, completed thesis will be presented to lecturers committee

#### **YDI431 Technical Foreign Language I (English)**

Research, Discovery, Innovation, Ecology and environment, Pollution, Sustainable development, Medicine, health, Genetics, biotechnology, Physics, matter, states and properties, Forces, mass ve energy, Solid-state physics, Particles, nuclear fission and fusion, Space and universe, Satellites, manned flight, shuttlesand space stations,

#### **MLM-TOS1 Non-Technical Optional Course - 1**

## **8.SEMESTER**

#### **HUK444 Business Law and Ethics**

Law, right and obligation of working, employment law and contents of this law, Features and sources of employment law, employment organization, Debts due to employment (labor) contracts, Breathers, general holiday and annual leave of absence, Occupational health and safety

#### **ISL444 Industrial Organization and Management**

Fundamental Concepts. Industrial Economics. Analysis on Turkey Industry. Strategic Management. Industrial Risk and Forecasting. Building the internal organization. Organizing the physical facilities- Plant Location and Building. Planning For Production. Controlling Materials and Production

Mechanisms. Principles of Industrial Relations. Personal Management. Selling the product. Budgetary Control. Coordinating the Enterprise.

#### **YDI432 Technical Foreign Language II (English)**

Atomic bonding, crystal lattices, crystal defects, diffusion, mechanical properties of materials, phase diagrams, magnetic properties, electrical properties, deformation, heat treatment, failure, alloys, composites, ceramics

#### **MLM-TOS2 Non-Technical Optional Course - 2**

#### **MLM498 Graduation Project II**

Each student will study about subject that determined with lecturers at material department. BSc. thesis will be determined, literature survey will be searched, and contents of thesis will be written. Finally, completed thesis will be presented to lecturers committee

#### **MLM-TS7 Technical Elective - 7**

#### **MLM-TS5,6 Technical Optional Course - 5-6**

## **5. SEMESTER MLM-TS1,2**

#### **MLM331 Principles of Casting**

Solidification of Pure Metals, Alloys Solidification; macrostructure Development of Rate of solidification, solidifying Heat Transfer; Feeder Design and Placement; Runner System; Solidification Sources of Stress and Strain; Casting Technology; Melting Methods & Furnaces; Mold and Core Making

#### **MLM333 Solidification Technique of Metals and Alloys**

Liquids and Solids, Solidification of pure metals, Homogeneous and heterogeneous nucleation, Solidification of alloys, Undercooling, Solidification of eutectics, Constitutional undercooling. Growth in pure metal and alloys, Macrostructure development, Classification of alloys according to their freezing range, The rate of solidification, Heat transfer in solidification. Segregation, Single crystal growth, Rapid solidification.

#### **MLM335 Basic Casting Technologies**

Basic casting techniques and the classification of traditional casting techniques, advanced casting techniques, for different casting techniques, mold design, molding techniques for different materials selection, casting techniques

#### **MLM341 Welding Metallurgy**

Welding methods, heat transfer of welding area, stretching depending upon heat changes, welding metal, liquid reactions, solidification and microstructure, phase transformations during cooling, effect of filler metal process conditions, properties of austenite, cracks and cleavage, failure of the process.

#### **MLM343 Welding Technology**

Atomic hydrogen welding. Plasma-welding origin systems. Electron light welding. Laser welding. Electro-scan welding, submerged welding, solid-state welding techniques, friction welding,

diffusion welding, ultrasonic welding, the welding of different metals, the combinations of metal-ceramics, private cutting techniques.

### **MLM345 Weldability of Materials**

This is a lecture designed to give the student exposure to the chemical composition, metallurgical aspects, applications, weldability, and specific requirements for welding various metal alloys. The metallurgical response to heating and cooling during the welding cycle will be emphasized, along with proper welding techniques and requirements. Ferrous and nonferrous alloys will be addressed

### **MLM351 Metal Alloys**

Atomic structure and properties, Metallic solid solutions, Metallic elements, Metallic compounds, The Gibbs phase rule, Hume-Rothery rules, Drawing of the Equilibrium diagrams, Binary phase diagrams, Compounds equilibrium diagrams, Ternary equilibrium diagrams, Solidification and dispersion strengthening, Aging, and Precipitation hardening, Aluminum and its alloys, Copper and its alloys, Zinc and its alloys, Titanium and its alloys, Nickel and its alloys, Magnesium and its alloys, Super alloys.

### **MLM355 Surface Processing**

General information about the surface techniques Metallic and non-metallic coatings Ceramic coating techniques PVD, CVD, sol-gel technique Detonation technique, plasma spraying technique, Flame Spray Technique corrosion Electrolytic coatings Mechanical coatings Organic coating Coating Materials Environmentally friendly coatings Environmental problems in surface treatment Tests for Coatings Surface characterization

### **MLM361 Polymer Processing Technology I**

Presentation of the injection molding, injection unit, hydraulic motor unit, screw-cylinder unit, general information about the injection screw, the problems encountered during production and removal methods, properties of polymer used for injection molding method, machine maintenance and security.

### **MLM363 Polymer Science**

Introduction to Nonmetallic Engineering Materials, Linear, Branched and Crosslinked Polymers, General and Comparative Look for Nonmetallic Engineering Materials, Introduction to Plastics, Monomer, Polymer, Polymer Chain Concepts, Usage Fields of Polymers with respect to Sectors, Situation in Turkey and World, A Short Look at Polymer Processing, Raw Materials for Polymer Production, Synthesis of Polymers, Step and Addition Polymerisation, Mol Mass, Initiator, Oligomer, Degree of Polymerisation, High-Low Polymers, Homopolymer, Copolymer, Configuration, Conformation, Crystal Structure of Polymers, Molecular Weight and Molecular Weight Distribution, Narrow and Broad Distributions, Thermal Behaviour of Polymers, Glass Transition Temperature, Melting Point, Structure-Property Relations in Polymers, Usage Fields and Properties of Some Commercial Polymers.

### **MLM365 Properties of Polymers**

General properties of polymers:

Types of polymers. Linear and nonlinear polymers. Thermoplastics and thermosets.

Polymerization techniques.

Natural and synthetic polymers, fibers and elastomers.

Production of thermoplastics.

the production of thermoset

Rheology of Polymers.

The mechanical properties of polymers  
Physical and chemical properties of Polymers  
Residual stresses in polymers  
Plastic production technology, and potential problems.  
Engineering Polymers  
Polymer Additives  
The recycling of polymers

#### **MLM371 Industrial Ceramics**

Fuels and combustion in ceramic kilns and furnaces, Non-conventional source of energy for burning ceramic kiln, Solid Fuels, Liquid Fuels & Gaseous Fuels, Coke is prepared in coke oven, Ceramic kilns, Metallurgical furnaces, Energy Conservation in Ceramic Industry, Refractory standard bricks, Cement concrete products, Pyrometers.

#### **MLM373 Ceramic Materials**

What is ceramic material?, Ceramic history, Ceramic structure, Plastic Shaping methods of Ceramic Fabrication, Ceramic mining, Various sources of ceramic raw materials from earth crust and their importance, Ceramic glazes, Refractories and their classification and their manufacturing process, Acid Refractories, Basic Refractories, Ceramic tests, Ceramic analysis.

#### **MLM375 Principles of Ceramic Processing**

Definition and classification of ceramic materials, ceramic materials, basic information related to the production of ceramic powder production, design of ceramic powders, the full density processing, ceramic materials, test methods, applications of ceramic materials, advanced ceramic materials

## **6.SEMESTER MLM-S3,4**

#### **MLM332 Casting of Ferrous Materials**

Identification and classification of ferrous materials, iron-based materials, melting and solidification, the phase diagrams of iron-based materials, conventional and advanced casting techniques for iron-based materials, molding design for the part, after casting quality control procedures and safety

#### **MLM334 Design of Casting Mold**

Casting techniques, different molds for casting techniques, mold materials and binders, gating design, entry design, design of mold cavities, shrinkage cavities, and the calculation of design, computer aided design and modeling, mold design practices

#### **MLM336 Casting Quality Control**

Basic casting techniques and the classification of traditional casting techniques, advanced casting techniques, for different casting techniques, mold design, molding techniques for different materials selection, casting techniques

#### **MLM342 Welding of Non-Ferrous Metals**

The course aims at providing students with welding methods used in the metallic materials, applications in pre welding, welding and post welding treatments, factors selection of the filler

metals depending on alloy compositions, performance and behavior of welding in service conditions, welding techniques applied on different alloys, welding application on widely used metallic alloys

#### **MLM344 Welding Standards**

The welding applications with basic , rutile , concise and etc. electrodes , welding transformer , welding rectifier , welding generator , voltage and amper adjustments, stitching features, electrode selection TIG,MIG,MAG, alloys of non-iron metals and compounds, of cast-material, welding of alloyed and high carbonized steels, welding faults and precautions.

#### **MLM346 Advanced Welding Methods**

One of the manufacturing method in industry is joined with welding process that providing welding to carry out with effective and accurateness for different and same type of materials by automations

#### **MLM352 Composite Materials**

Introduction to composites, Composites structures and components, used in the matrix materials in composites, fibers used in composites, plastic matrix composites, metal matrix composites, ceramic matrix composites, composites manufacturing methods, uses glass fiber composites, carbon fiber composites usage, Kevlar uses of fiber reinforced composites, metal fiber composites usage, manufacturing defects in composites

#### **MLM354 Speacial Steels**

The effect of Fe-C binary phase diagram of alloying elements, steel standards used in different countries, and the properties of plain carbon steels, alloy steels, types, properties and applications, stainless steels, types, properties and application areas, the classification of tool steels, properties and application areas.

#### **MLM356 Powder Metallurgy**

Principles of the production method of powder metallurgy, powder production methods, powder forming methods, sintering techniques, processes after sintering, powder metallurgy and economics of application areas

#### **MLM362 Polymer Processing Technology II**

Presentation of the extrusion molding, extrusion unit, hydraulic motor unit, screw-cylinder unit, gereal information about the extrusion screw, the problems encountered during production and removal methods, properties of polymer used for extrusion molding method , machine maintenance and security.

#### **MLM364 Polymer Blends**

What is polymer alloys and blends, compotibilization, purpose of making a polymer alloys and blends, binary and ternary polymer blends, compatible and incompatible polymer blends, commercial polymer blends, mixing methods, desing of the polymer mixture and mixing equipment

#### **MLM366 Characterization of Polymers**

Definition of an average molecular weight of polymers. Different methods of number average, weight average and viscosity average molecular weights (end group analysis, viscosity measurements, light scattering and gel permeation chromatography), UV, FT-IR, NMR methods, such as the microstructure of polymers (configuration and conformation of a chemical bond) to

determine , solid-state structures of polymers by the method of determination of X-ray and SEM, thermal properties of polymers (melting and decomposition behavior, glass transition temperature) investigation of DSC and TGA methods.

#### **MLM372 Glass Science and Technology**

Glass ergiyiklerinin flow behavior, the factors affecting the measurement, and this feature, Glass products, strength, fracture analysis, glass coloring, color additives, and Decolorisation colloidal, chemical stability of the glass, mechanism and factors affecting

#### **MLM374 Refractories and Industrial Furnaces**

Classification of Refractory materials and their properties. Silica; Magnesite, Dolomite; Chrome and Chrome-Magnesite refractories. Monolithic refractories, Isolation refractories; Classification of furnaces according to their technology and design. Metal melting furnaces; Metal heating and heat treatment furnaces; Ceramic furnaces. Selection criteria's for furnaces.

#### **MLM376 Sintering Theory of Ceramics**

Powder characterization for ceramics, Sintering fundamentals, Solid-state sintering and liquid-phase sintering, Sintering difficulties for ceramics, Solid solution additives and their role in microstructure control, Practical methods for improving sintering techniques, The effects of process variables on sintering behavior in ceramics, Applications of sintering to the development of advanced ceramics.

## **7.SEMESTER MLM-TOS1**

#### **BSB441 History of Science**

What is the science? Science deals with what? Power of Science. What is the History of Science? Science First Times. In some countries, science (Science in China, India Science, Middle Asia Science, Science in Egypt). Periodical development of science. Science in the Middle Ages. The Renaissance to the Scientific Revolution of the 17th and 18 Centuries of Science, 19 Century of Science (Industrial Revolution, and Science),20th Century of Science (Contemporary Science). Impact of basic research in science.

#### **BSB443 Environment and Energy**

Protection and improvement of the environment, human life and ecological balance, hydrogen technologies and fuel cells, renewable energy technologies, energy storage technologies and power electronics, nuclear energy technology, environmentally sensitive and efficient fuel and combustion technology, water treatment technologies, waste assessment technologies.

#### **BSB445 Report Preparation and Presentation Techniques**

Science concepts (science, theories, laws, rules, policies, systems, arguments, assumptions, hypotheses, methods)

The process of scientific research, Scientific research methods

Phases of scientific research methods, Scientific determination of the requirements for project preparation

Scientific project preparation and identification of targets

The emphasis on content creation and identification of projects, Project management and team building

Extraction of the project results, evaluation of home in terms of content of statistical analysis, Dissemination of project results, Preparation of technical papers and articles

Preparing scientific papers and general formatting

As an effective presentation of data and presentation techniques, Ethical conduct and confidentiality agreements

#### **DB441 Behavioural Science**

Behavioral sciences, sociology, psychology, anthropology and its relation to the Social and moral Attitudes, motives, learning, mental health

#### **DB443 Work Psychology**

The definition of work psychology, work areas, differences in industrial psychology, the importance of personnel selection, training plans and benefits, performance evaluation, the importance of psychologist in health care jobs. The relationship between psychology and and business psychology and rehabilitation work. Ergonomics and anthropometry. Occupational health and safety. The importance of industrial accidents, environmental, chemicals and human factors in accidents

#### **ISL441 Entrepreneurship**

Basic Definitions & Concepts of Entrepreneurship, Role in Economic Development, Product Planning & Development, New Ideas, Industry Analysis & Market Research, Analysis and Financial Statements, Budgeting, Financial Ratios, Goal Setting - Vision, Preparation of the Marketing Plan, Technology & Marketing, Five Forces Model

#### **KSS441 City and Culture: Istanbul**

This course focuses on helping students recognise, comprehend and perceive the city of Istanbul and its surroundings, depending on the interrelation between city and culture.

## **8. SEMESTER MLM-TOS2**

#### **BSB442 History of Civilization**

Ancient Greek History, History of Urartu, the Uyghur History, History of the Khazars, Khorezm Empire History, Ghaznavids History, Alexander the Great Empire, History of the Oghuz Turks, Egyptian civilization, the Mesopotamian civilization, the Lydian Civilization, History of the Hittites, Phrygian civilization, History of the Byzantine Empire, the Romans Date , History of the Ottoman Empire.

#### **BSB444 Ottoman History**

The situation on the establishment of the Ottoman Empire in Anatolia and the Balkans, the political course will be covered, it will be assessed the effects of the establishment of the Ottoman Empire. After installing the second phase of the Ottoman Empire in Anatolia, the Balkans, and Saudi Arabia held Mesopotamian conquests will be discussed. This is of course the Black Sea, the Aegean, the Adriatic Sea at the activities will be provided.

### **BSB446 Social Organization**

Science concepts (science, theories, laws, rules, policies, systems, arguments, assumptions, hypotheses, methods) The process of scientific research, Scientific research methods Phases of scientific research methods, Scientific determination of the requirements for project preparation Scientific project preparation and identification of targets The emphasis on content creation and identification of projects, Project management and team building Extraction of the project results, evaluation of home in terms of content of statistical analysis, Dissemination of project results, Preparation of technical papers and articles Preparing scientific papers and general formatting As an effective presentation of data and presentation techniques, Ethical conduct and confidentiality agreements

### **KSS442 Technical Communication**

Techniques of communications, technical communications at work

### **PAZ444 Technical Sales and Marketing**

All the basic concepts of marketing and technical sales

### **YON444 Leadership**

entrepreneurial intent and purpose of innovation, business creation, entrepreneurship risks.

### **YON448 Technology Management**

Definitions of technological management, improving the technological management, decide a mission and vision, approach to technological management

## **8. SEMESTER MLM-TS7**

### **MAM310 Hydraulic-Pneumatic**

Automation, automation pyramid and place of the hydraulics and pneumatics systems. Advantages and disadvantages of pneumatics, usage areas. Basic pneumatic system structure. Compressed air preparation and distribution. Air compressor types. Symbol of circuit elements. Direct and indirect control basics. Simulation of circuits by using FLUIDSIM software. Position and pressure dependent control. Time and counter dependent control. Sequential control, time-step diagrams, signal overlaps. Signal overlap solutions: Idle valve solution and kaskad method solutions. Electropneumatics systems. Electropneumatics system design. Hydraulics systems, basic concepts. Hydraulics system design and dimensioning. Pressure and position dependent control. Electrohydraulics circuit design and applications.

### **MAM312 Computer Aided Manufacturing (CAM)**

CNC machines, application areas. Structure of CNC machines. Introduction of the CNC turning centres and programming of them. M and G codes. Programming of outer and inner turning operations. Turning cycles. Introduction of the CNC turning simulation programs. Structure of CNC

milling machines. Programming of CNC milling centres. Absolute and incremental programming. Linear and circular interpolation. Programming of face milling, slot milling operations. Programming of pocket, contour milling. Cycles for milling operations. Sub programming. DNC Programming of the CNC turning and milling centers with dialog programming. Programming of outer and inner turning operations. Turning cycles. Programming of face milling, slot milling operations. Programming of pocket, contour milling. Macro programming Machine parameters DNC CIM Applications

#### **MLM482 Corrosion and Corrosion Protection**

Corrosion and Corrosion economy, the basic principles of corrosion, corrosion types and formation, corrosion-resistant materials and types, the basic principles of corrosion protection, corrosion protection and application of methods

#### **MLM484 Methods of Thermal Analysis**

Thermogravimetric analysis (TGA) and applications, Derivatographic thermogravimetric analysis (DTGA) and applications, differential thermal analysis (DTA) and applications, Derivatographic differential thermal analysis (DDTA) and applications, differential scanning calorimetry (DSC) and applications, thermomechanical analysis (TMA-Dilatometry) and applications, thermal conductivity and applications and Evolved gas analysis (EGA) methods and applications.

#### **MLM486 X-Ray Diffraction**

Introduction to the crystallographic nature of materials, Bravais lattices, Crystal structures, Crystal symmetry, Miller and Miller-Bravais indices, Atomic packing and bonding, Origin of X-rays, Production and absorption of X-rays, Theory of diffraction of X-rays, Selected X-ray diffraction methods, Applications of X-ray diffraction to problems in materials science and nanotechnology

## **8.SEMESTER MLM-TS5,6**

#### **MLM432 Computer-Aided Casting Desing**

Solidification of Pure Metals, Alloys Solidification; macrostructure Development of Rate of solidification, solidifying Heat Transfer; Feeder Design and Placement; Runner System; Solidification Sources of Stress and Strain; Casting Technology; Melting Methods & Furnaces; Mold and Core Making

#### **MLM434 Casting of Non-Ferrous Materials**

Preparation of the mold and core sands of aluminum and magnesium alloys, Making molds and cores, Apply runner, riser and chill, Smelting of nonferrous metals, Preparation of the alloys, Casting patterns, Decoration foundry, Heat treatment of casting parts, Metallurgical processes of aluminum and magnesium alloys, Grain refinement and modification, Microstructural examination.

#### **MLM436 Advanced Casting Techniques**

Metal castings, Metal die casting, Light metal casting, Metal spin casting, Small metal casting, Advanced casting process a wide range of alloys (including stellite, inconel, hastalloy and

superduplex as well as stainless steels), Investment castings-near net shapes, Non-traditional casting processes, Alternative molding media, Micro/macro casting defects analysis,

#### **MLM442 Welded Construction and Design**

This course provides criteria and guidance for the design and specification of welded structural components and systems in accordance with current technology, standards and materials. This includes information on design approaches, use of technical manuals, guidance on the application of codes and industry standards, and the design and specification of welded details, inspection and quality. The scope of this course for general building construction and including underwater, piping, for cryogenic applications, bridges, sheet steels shows how to weld

#### **MLM444 Welding Tests and Failure Analysis**

Description of welding test and knowing about aim of welding test. Evaluation of weld and HAZ microstructure, Welding procedure specification and qualification reviews, Assessment of inspection and testing procedures, Evaluate past corrective actions, Weld failure analysis and corrective action plans, Evaluate joint integrity, Development of alternative flaw acceptance criteria

#### **MLM446 Applications of Welded Steel Construction**

Steel used in steel structure construction and general concepts. Structural elements of the global structure of steel, assembly tools and assembly elements. Stress analysis, the combined stress, reliability and other factors are stress safety.

Force and moment under the load cross-section material selection, welding, rivets and bolts for connections and cross-section determination. Welded construction and steel construction projects studies and design principles. Manufacturing process from design and project quality control process reliability.

#### **MLM452 Biomaterials**

Introduction to Biomaterials Science and Technology, Metals, Ceramics and Polymers, Biomaterials, Cells and Tissues, Skeletal System, Biomedical Polymers, Biomedical hydrogels, Repair of skeletal tissues, Artificial Organs, Artificial changeable systems, Vascular auxiliary systems, Introduction to the tissue engineering, Main structure for tissue engineering, Tissue engineering and cell culture applications,

#### **MLM454 Electronic Properties of Materials**

Free-electron theory, The theory of band and banding at the electron energy levels, To be quantum for free-electron energies, Fermi-Dirac statistics, Brillouin zones, Intrinsic and extrinsic conductivity, Contact potential, Work function, Thermionic emission, Photoelectric, Thompson-Peltier effect, Electrical conductivity for metal and alloys, Super conductivity, Magnetic properties of materials.

### **MLM456 Strengthening Mechanisms**

Dislocations, Dislocations and interactions of dislocations with obstacles, Precipitation hardening, Martensitic transformation, Work hardening

### **MLM462 Polymer Product Design**

Classification of polymers, production methods, with appropriate method of a polymer selected from the production, manufacturing rules, Screw speed pressure and temperature effects. Product geometry of mold properties, viscosity. Polymer additives to be added.

### **MLM464 Engineering Polymers**

Historical development and classification of polymers;  
General properties of polymeric materials;  
Monomer synthesis;  
Industrial Polymers,  
Addition polymers: Polystyrene and styrene copolymers,  
Acrylic polymers,  
Polyethylene and ethylene copolymers, polypropylene,  
polyvinyl chloride, polyvinyl alcohol,  
Fluoro polymers and polytetrafluoroethylene,  
Condensation polymers: phenolic resins,  
Amino resins, polyurethanes,  
Polyesters and epoxy resins,  
silicones, polyamides,  
polycarbonates, polyimides ...

### **MLM466 Mold Design of Polymeric Materials**

Defining and classification of injection molding, heating and cooling of molds, mold tolerances, selection of runners, gates, hot and cold gate and runner systems, mold materials, mold polishing, maintenance of molds, wear on the molds

### **MLM472 Dielectrics and Electroceramics**

Economic Indicators in Ceramic Industry, Ceramic Production Processes, Processes of displacement of cargo, Dielectrics in Static Electric Field Under Alternative dielectrics in an electric field, Capacitive Applications, Dielectric Strength, Thermal Shock Resistance, Capacitors, Types and Applications of the basic ceramic, low porosity ceramic dielectrics and insulators, Ceramics Middle permeability, high porosity ceramics, ceramic conductors, ohmic resistors, temperature-sensitive resistors, Fuel Cells and Batteries, Piezoelektrikler, Basic Theoretical Infrastructure, Piezoelectric ceramics, Parameters and Measurement, Magnetic Ceramics, Model ferrites, Magnetic Properties Affecting Behavior , ferrites Production, Application Areas

### **MLM474 Advanced Technology Ceramic Materials**

Definition and classification of ceramic materials, basic information about the production of advanced ceramic materials, advanced ceramic materials production methods, advanced ceramic materials specifications and test methods, explore new opportunities for advanced ceramic materials

### **MLM476 Crystal Chemistry**

Chemical elements, minerals and raw materials, melting and boiling points, Crystal systems, morphology and crystal growth, Symmetry elements and point groups, glass structure, Calcite, Perovskite