

T.C.  
CUMHURİYET UNIVERSITY FACULTY OF TECHNOLOGY  
DEPARTMENT OF MECHATRONICS ENGINEERING  
COURSE CONTENTS

**PREPARATORY PROGRAM (M.T.O.K) I.SEMESTER (L P C)**

**BHT 101 Mathematics (7 0 7)**

Matrix transformation and the solution with Cramer's method of the systems of linear equations. The sums, subtractions and multiplications of vector quantities. Cartesian coordinates and line equations in the plane, linear equation, circle equation; parabola, hyperbola and ellipse equations. Concept of sets, numbers, the greatest integer and absolute value functions. Functions and their graphics, power functions, exponential and logarithmic functions, trigonometric functions, inverse trigonometric functions, implicit functions, hyperbolic functions. Determination of the roots of quadratic and cubic equations. Complex numbers, polar coordinate system, introduction of number sequences. Functions two variable; introduction of equations of such surfaces as plane, sphere, paraboloid. Introducing of limit and continuity.

**BHT 101 Physics (5 0 5)**

Units, vectors, motion in one dimension, two dimensional motion, fundamental forces, laws of motion, work and energy, circular motion, applications of laws of motion, potential energy, conservation of energy, linear momentum and collisions, volution, Rolling motion and angular momentum, torque, static equilibrium, vibration motion, universal gravitational force, pressure and fundamentals of fluid mechanics.

**BHT 101 Chemistry (3 0 3)**

Chemical science, definitons and properties of matter, units and conversion factors, significant figures, measurement error and error analysis mass, volume and density measurements, atoms, molecules and ions, quantum theory and the electronic structure of atoms, periodic relationship of elements, chemical reactions, chemical equations and reactions in aqueous solutions, mass relations, chemical bonds, the gas phase of matter.

**PREPARATORY PROGRAM (M.T.O.K) II.SEMESTER**

**BHT 102 Mathematics II (7 0 7)**

The definition of the derivative and strengthening with numerical examples. Obtaining the derivatve formulas of power functions whose exponent is integer. Obtaining the derivatve formulas of trigonometric functions. Obtaining the derivatve formulas of exponential functions. Obtaining the derivatve formulas of logarithmic functions. Using the differentiation operator (d/dx). The derivative of power functions whose exponent is the number of fractional or negative. The derivative of multiplication or division. Determination of the derivatives of complex expressions by conversion. the physical and geometric applications of derivative. Introduction of differential. Introduction of infinite integral and derivation of the basic integral formulas

**BHT 102 Physics II (5 0 5)**

Electrical charge and Coulomb's law, the concept of the electric field, Gauss's law and applications, electrical potential, classification in terms of conductivity of the matters and capacitor, the concept of current and resistance, direct current circuits, the concept of magnetic field, Ampere's law Faraday's law of induction, the classification of matters magnetically and coils, RC, RL and RLC circuits and applications, alternating current, electromagnetic waves and Maxwell equations.

**BHT 102 Chemistry II (3 0 3)**

Thermodynamics, enthalpy, entropy, free energy, chemical equilibrium, general properties of the acid and base, acid-base balance, dissolution and solubility equilibrium, chemical kinetics.

**1. CLASS I. SEMESTER**

**UTÜR1001 Turkish Language-I (2 0 2)**

The history of Turkish language, the history of the world's languages, classification of languages, Turkish sounds, repertoire of vocabulary, expressions, proverbs, aphorisms and explanation of them.

**UYDİ1001 English-I (2 0 2)**

Reading, writing, pronunciations, Introduction to composition techniques, concept words in the English language laboratories, expressions, proverbs, aphorisms, theoretical and practical applications.

**MAT1155 Genearl Mathematics-I (4 0 4)**

Real and complex numbers, sentences, permutation, inversion and combination calculations; probability, group, ring, substance, vector spaces, length, angle and projection calculations, matrices and determinants, linear equation systems.

**FİZ1111 General Physics-I (4 0 4)**

Vectors, equilibrium, moment of a force, linear motion, Newton's second law, planar motion, work and energy, impulse and momentum, volution, flexibility, harmonic motions.

**KİM1041 General Chemistry (3 0 3)**

The basic method to emphasize the metric system, introduction to atomic theory, stoichiometry, structural and physical properties of matter( for example; electronic structure of atoms, chemical coupling, molecular geometry, hybridization and molecular orbitals and states of matter.) discussion of the physical properties of solutions in aqueous solution, chemical kinetics, chemical thermodynamics and electrochemistry.

**UNF1100 Basic Information Technology Usage (2 0 2)**

Basic information about the computer, windows operating system, word processing, using the database, preparing a presentation and graphics applications.

**MKT1003 Introduction to Mechatronics Engineering (2 0 2)**

Definition and principles of Mechatronics Engineering. The engineering profession and ethics. Other engineering fields, the place and necessity of other engineering disciplines of Mechatronics Engineering. Expectations from Mechatronics Engineering. Machines and their components. The importance of the development of mechatronic products. The acquisition of problem-solving skills on a real engineering problem. The place and importance of mechatronics technology in the future.

**MKT1005 Technical Drawing (3 1 4)**

The definition and use of technical drawing tools, basic geometric drawings, conjugate vertical projection, perspective, sections, dimensioning and tolerancing, screw drawings, links, construction drawings, auxiliary views, sections, tolerances, surface quality marks, standards, gears, Installation photos, the complete drawing.

**1. CLASS II. SEMESTER****UTÜR1002 Turkish Language -II (2 0 2)**

Turkish grammar, nouns, noun classification, adjectives, verbs, prepositions, connectors, exclamations, adverbs, sentences, analysis of sentences, subjects, objects, predicates, explanations, pronunciation, essays, report writing techniques, literature, literary genres.

**UYDİ1002 English-II (2 0 2)**

Development of practice in English grammar. Vocabulary practice, formulations of sentences, nouns, adjectives, adverbs, verbs... English language labs, theoretical and practical language applications.

**MAT1156 General Mathematics-II (4 0 4)**

Limits, continuity, derivative, inverse derivative, definition of the integral, the fundamental theorem of differential and integral calculus, derivative applications, transcendental functions, geometric moments, androids, moments of inertia.

**FİZ1112 General Physics-II (4 0 4)**

Electrical, electrostatic, Coulomb's law, electric field, potential, capacitor, properties of dielectric, electrokinetic, current and resistance, direct current circuits, alternating currents.

**MKT1002 Computer Aided Design (3 1 4)**

Three-dimensional machine on computer, product modeling techniques, prismatic and cylindrical part modelling, solid and surface modeling, the operations require<d for the processing of surfaces, CNC codes derivation methods and sending code to CNC lathe. The comparison of different and up-to-date CAD/CAM programs by being introduced. 2D, 3D and solid modeling applications with CAD/CAM programs, the computer-aided- process planning with parts modeling in CAD environment and manufacturing applications in CNC lathes, transition phase from design to manufacturing, product design techniques.

Current and voltage equations of the circuit elements, simplification of electrical circuits, sources, source transformations, source functions, simplification of sources. Kirchhoff's current and voltage laws, environmental flows, node method, superposition, Thevenin, Norton, the maximum power theorems and related experiments. First order electric circuits and the general solutions of differential equations, time constants, the creation of graphic drawing. Second order electric circuits, the solutions of differential equations and their graphics, examination and experiments of the RLC circuits, different electric circuit topologies and analysis by using package programs.

**MKT1006 Engineering Mechanics (3 1 4)**

Definition of mechanics, basic concepts, vector operations, balance of particles, planar and spatial force systems, the resultant forces and moments, truss systems, weight and geometric centers, moment of inertia, kinematic of particle. Kinetic of particle: Force and acceleration, work and energy, impulse and momentums.

**2.CLASS III.SEMESTER****UATA1001 Principles Of Atatürk And History Of Turkish Revolution-I (2 0 2)**

Introduction to the basic concepts of Kemalism in the Republic of Turkey, The collapse of the Ottoman Empire and the reasons for reading revolution, disintegration of the Ottoman Empire, Armistice cease-fire agreement, country status, Mustafa Kemal's response, The first step in the national struggle, organization of congresses, Kuva-i milliye and Misak-ı milli, Parliament's(TBMM) opening, national struggle in social and economic areas, From Mudanya to Lausanne.

**MAT2256 Engineering Mathematics (2 2 3)**

Fourier series, differential equations, Laplace-inverse Laplace Transform and applications, numerical solution of ordinary differential equations, initial value problem, partial differential equations, boundary value problem, double and triple integrals, sequence and substitution, cylindrical and spherical coordinates in two and triple integrals, line integrals, surface integrals, divergence and stokes theorems

**MKT2001 Business English-I (2 2 3)**

Revisions of tenses. The Future Continuous Tense. Used to, be used to, would, would rather, prefer. The Past Perfect Tense, The Future Perfect Tense, Conditional Sentences. Translation.

**MKT2003 Electronics-I (3 2 4)**

Electronic circuit elements, conductor, insulator, semiconductor structures, diode characteristics and models, rectifiers and sample applications, BJT characteristics and applications. Forward bias varieties, the stability of forward-bias circuit. Analysis and design of single-layer and multi-layer transistor amplifiers.

**MKT2005 Computer Programming-I (2 2 3)**

Introduction to computer programming, operators, conditional expressions. Command code patterns, iterative programs. Analysis and extraction with functions, floating-point numbers, sequential perfecting, root finding. Introduction to lists, Bisection method. Newton Raphson method. Lists and variability. Dictionaries and pseudo codes. Complex numbers. Logarithmic and quadratic equations.

**MKT2007 Strength of Materials (2 2 3)**

The principles of strength, normal force- shear force- moment diagrams, two and three axial stress condition, transformation, strain-transformation relations. Compound strain state, finding bending in beams, torsion, bending, breakage, fracture and yield theories.

**MKT2009 Material Science (3 0 3)**

Introduction, Concept of stress, torsion, bending, shear force and moment diagrams in beams and thin-walled elements in the Shear Stress, Stress and Strain Transformation Relations, transmission shafts Design, Compound Downloads Under Stresses, deflections in beams, buckling, energy methods.

**2. CLASS IV. SEMESTER****JATA1002 Principles Of Atatürk And History Of Turkish Revolution-II (2 0 2)**

Two great revolutions in the field of strategy and policy at the Revolution, Terakki Perver Cumhuriyet Fırkası and Takrir-i Sükun period, law revolution, educational and cultural revolution, social and health revolutions, Foreign policy of the Republic of Turkey, Turkey's geopolitical position.

**MKT2002 Business English-II (2 2 3)**

The passive voice, inversions. The gerund and present participle. The gerund and the infinitive. Adjective clauses. The relative pronouns. Adverbial and noun clauses. Indirect speech, causatives. Using phrasal verbs. Writing paragraphs. Translation.

**MKT2004 Electronics-II (3 2 4)**

Transistor types, characteristics and applications. Bode gain and phase curves, A, B, AB, C ve D class amplifiers, overheating in power transistor and cooling accounts, noise, gain, efficiency and power accounts. Operational Amplifiers. Oscillator circuit design and applications. Active filter types. Marking non-linear signal circuits. FET and MOSFET structure, characteristics and circuit applications.

**MKT2006 Computer Programming-II (2 2 3)**

Testing and debugging, dynamic programming, optimal sub-problems, Knapsack analysis, data types, classification and methods, encapsulation and inheritance, computerized computational models, random processes, PyLab drawing, Monte Carlo simulation, approval of the simulation results, curve fitting, linear regression.

**MKT2008 Logic Circuits (2 2 3)**

Analog and digital concepts, number systems and conversions. Logic circuits, minimization of logic expressions. Combinational circuit design, reduction methods for solving function equations, counters, registers and holders. Encoders, decoders, code converters. Structure and design of sequential logic circuits. Memory elements, memory organization, memory decoder circuits, memory types, programmable logic devices and applications.

**MKT2010 Manufacturing Methods (2 0 2)**

Casting techniques, welding methods, machining and forming.

**MKT2012 Fluid Mechanics (2 0 2)**

Introduction to Fluid Mechanics, fluid properties and basic concepts, definition and classification of fluid motion, fluid statics, buoyancy and stability. Fluids in rigid body motion, Fluid kinematics, mass, Bernoulli and energy equations.

**3. CLASS V. SEMESTER****MKT3001 Signals and Systems (3 2 4)**

Examination of the signals and systems according to time and frequency. Repetitive signals. Fourier transform. Discrete Fourier transform. Convolution. Filters. Functions used to transfer information. Examination of signals and systems at discrete time.

**MKT3003 Occupational Safety and Health (2 0 2)**

Development of WHS concepts and rules, safety culture, WHS units and boards, risk management, physical, chemical, biological and psychosocial risk factors, ergonomics, fire, emergency plans, health and safety signs, ventilation and air conditioning principals, personal protectors.

**MKT3005 Electrical Machines (3 2 4)**

Introduction to electrical machines: Circular motion, Newton's law, power relations, classification of electrical machines, energy conversion in electrical machines, basic law used in electrical machines (induction law, biot-savart law, Ampere's law, electro-magnetic circuit). Transformers: Structure and types of transformers, the equivalent circuits of transformers, single-phased and three-phased transformers, instrument transformers. Introduction to Direct Circuit (DC) machines: Linear DC machines, commutation and armature reaction in DC machines, the structure of armature in DC machines, torque and voltage induction. Power flow and losses in DC machines, DC motor types, equivalent circuits and characteristics. Load and speed control methods in DC motors. The principles of operation of brushless DC motor and control methods. Introduction to Alternative Current (AC) machines: rotating magnetic field, mmf and flux distribution in AC machines, voltage and torque induction. Power flow and losses in AC machines. Introduction to asynchronous motors: equivalent circuits of asynchronous motors, torque, power and torque speed characteristics. Load and speed control methods in asynchronous motors. The principle of stepper motor and driver circuits.

**MKT3007 Sensors and Actuators (2 2 3)**

Linear and rotary sensors, acceleration sensors, force measurement, torque, power measurement, flow measurement, temperature measurement, distance measurement, integrated micro sensors, magnetic, inductive, capacitive, ultrasonic, microwave and optical non-contact sensors. Electromechanical actuators, piezoelectric actuators, hydraulic actuators, pneumatic actuators.

**MKT3009 Mechanisms (2 1 3)**

Introduction to mechanisms; mechanism examples, basic definitions, degrees of freedom, restriction of movement of kinematic elements, classification of mechanisms. Kinematic analysis of linkage mechanisms, position, velocity and acceleration analysis with graphical and analytical methods. Linear mechanical systems, equivalent mechanisms, mechanisms synthesis, force analysis, gear mechanisms, cam mechanisms. Static and dynamic force analysis in mechanisms: graphical and analytical methods. Friction models and friction force analysis. Imbalance analysis and balancing, flywheel selection.

**MKT3011 Practical Entrepreneurship-I (2 0 2)**

Entrepreneurship properties testing, developing a business idea and creativity exercises.

Business plan concept and elements (market research, marketing plan, manufacturing plan, management plan, financial plan).

**3. CLASS VI. SEMESTER****MKT3002 System Dynamics and Control (3 2 4)**

Structures and properties of open and closed loop control systems, calculation of transfer function. Simplification methods in block diagrams. Signal flow diagrams, state-space model. Derivation of mathematical models of electrical and mechanical systems, electrical and mechanical system similarities. Modeling of electro-mechanical systems and related sample calculations. The first and second order system response analysis in the time domain. In the complex s-plane zero-pole distribution of the transfer function. The concept of stability in the systems. Stability with Hurwitz determinants. Root locus and stability concept. Package program (Matlab Simulink Toolbox) applications. Frequency domain analysis of the systems. Stability analysis with Bode diagrams. Gain margin and phase margin concepts. Practice drawing of Bode diagram. Stability analysis with Nyquist diagram. Critical frequency and critical gain calculations. Controller concept, structure and types in systems. Ziegler-Nichols conventional controller design according to the method of the vibration. Matlab applications related to subjects.

**MKT3004 Microcontrollers (2 2 3)**

Microprocessor and microcontroller concepts, comparison, examination of the hardware architecture, development environments and languages for microcontrollers. Microcontroller architectures, differences between architectures, usage area, development tools, advantages and disadvantages. Program development and system simulation, debugging.

**MKT3006 Power Electronics (3 2 4)**

Introduction to power electronics. Semiconductor power switches: diode, thyristor, triac, GTO, BJT, MOSFET, IGBT and MCT. Power losses in semiconductor. Drive circuits of semiconductor power switches. Operating principles of single-phase and three-phase, unsupervised and supervised rectifiers. Rectifier circuit analysis for various loads. Inductive correction, capacitive correction and power factor in rectifiers. Single-phase and three-phase AC choppers and operating principles. DC-DC choppers and operating principles. Inverter circuits and operating principles. Inverter circuit analysis and analysis for various loads. Frequency and voltage control methods in inverters: quarter square wave method, PWM method, Harmonic analysis of PWM inverters. DC and AC motor drivers and control.

**MKT3008 Computer Networks (2 2 3)**

OSI reference model, the standards of the layers. Serial communication, cable types, synchronous and asynchronous communication, character and frame synchronization, modem communication, connected, unconnected methods. LAN technologies and topologies, WAN Systems Overview, network hardware units. Routing methods, multi-route algorithms. TCP / IP layer, IP addressing classification, masking, IP forwarding.

**MKT3010 Hydraulic and Pneumatic Systems (2 1 3)**

Introduction to hydraulics. The basic principles of hydraulics, standard symbols, hydraulic pipes and hoses. Hydraulic pumps, motors and cylinders. Seals, hydraulic valves. Oil reservoir, filters, hydraulic accumulators, hydraulic fluids. Electro-hydraulic systems. Faults and their detections in hydraulic systems. Hydraulic circuits. Application areas of hydraulic in industry. Hydraulic circuit design and applications. Introduction to pneumatics. Physical principles in pneumatics. Air production, maintenance, and distribution. Standard symbols, cylinders, seals and motors in pneumatic. Pneumatic motors, valves. Pneumatic circuits and drawings. Circuit drawing methods. Hydro-pneumatic. Application areas of pneumatic systems. Fault finding. The electro-pneumatic. System design and installation. Programmable Logic Control system, programming and applications.

**MKT3012 Total Quality Management (2 0 2)**

Competition and quality concepts, historical development of quality and quality gurus, Total Quality Management Philosophy and Principles, Quality cultural in organizations and the quality responsibilities in activities, continuous improvement (Kaizen), quality costs, Suppliers on Total Quality Management, EFQM Excellence Model, Quality Management Systems, ISO 9000, ISO 14000.

**MKT3014 Practical Entrepreneurship-II (2 0 2)**

Workshops for reinforcing the elements of business plan (market research, marketing plan, manufacturing plan, management plan, financial plan).

The writing of business plans and issues to be considered in its presentation.

**4. CLASS VII. SEMESTER****MKT4001 Workplace Education (5 20 15)**

Monitoring and record keeping associated with it of hierarchical relationships in the workplace, responsibilities, organizational structure, work discipline and safety, following of adaptation to enterprises of technological developments in the sector with closely together the recognition of work-life. Monitoring and practicing implementation of quality processes, design and production, strengthening knowledge and skills acquired during their education, compatible study habits behave correctly and good communication skills required for the acquisition and implementation of the factors investigated.

**MKT4003 Internship Education I (0 0 0)**

Examination of manufacturing method in the entity, examination of the manufacturing process steps and manufacturing programs, the drawing of the parts' drawings, entity's general electrical installations, power and control boards, single and three phase systems, relays, contactors circuits, electrical machines and drive circuits, PLCs, grounding and examination of security issues in fitment, the examination of the entity's computer system.

**MKT4005 Internship Education II (0 0 0)**

Examination of business management hierarchical structure and drawing of organizational chart, examination of business control systems, drawing of Machine layout, making manufacturing work flow diagrams and time study work, entity's R&D activities, quality control organization and examination of quality control techniques, purchase, storage and investigation of the sales organization, examination of the staff and safety control systems.

**4. CLASS VIII. SEMESTER**

**MKT4002 Graduation Project (0 2 1)**

Performing of graduation project studies in consultation with the Project Manager, examination and development of Project studies under control of Project Manager, writing of the project studies according to the rules of spelling in a Thesis Writing Format, delivering of the Final Project.

**MKT4004 Digital Control (2 2 3)**

Conversion from s-plane to the z-plane, sampling, open-and closed-loop discrete-time systems. Mathematical models of discrete-time systems, time domain response characteristics and stability analysis techniques. Classic controller design in discrete time (PID), discrete-time controller design with rootlocus diagram. Frequency analysis of discrete-time systems. Transient and steady-state response of discrete-time systems and their performances. Discrete-time controller design with Bode diagram, time-optimal controller design with analytical method, state feedback controller design. Discrete-time systems modeling and simulation in software packages (e.g. MATLAB).

**MKT4006 Robotics (2 2 3)**

The basic elements used in robotic systems, structural features of the actuator, extreme elements, drives and drive systems, sensor types used in robotic. Derivation of robot kinematics equations. Robot inverse kinematics. Lagrange equation. Robot dynamics. Trajectory planning. The actuator control.

**MKT4008 Statistics and Probability (2 1 3)**

Basic concepts related to probability and statistics, random variables and custom functions, distribution and density functions, multivariate distributions and densities, independent random variables, implementation of the correlation statistics to engineering systems, counting techniques; multiplication rule, permutations, combinations. Concept of probability; Sigma Force, probability axioms, conditional probability, generating functions, decision theory. Estimation concept. Hypothesis testing, Non-parametric tests, correlation and regression, engineering applications.

**MKT4010 Computer Architecture (2 1 3)**

Basic information about computer architecture, performance evaluation, MIPS processors, arithmetic operations, pipeline principle, front and virtual memories, parallel processors.

***(Social Elective Course)*****MKT3013 Business Management and Economics (2 0 2)**

Production, Enterprises and Modern Management, Organization, Quality Control, Motion and Time Studies, Job Evaluation, Institution Planning, Site Selection and Problems, Production Engineering, Systems Analysis, Feasibility Studies, increase productivity Techniques, Engineering Economics.

**MKT3015 Photography (2 0 2)**

History of photo, basic principles, camera types, cameras partitions, lights and light sources, digital cameras, composition in the photography, portrait, landscape, interior drawings, photography applications.

***(Technical Elective Course-I)*****MKT4012 Advanced Manufacturing Methods (2 0 2)**

To learn the types of advanced welding techniques, a variety of non-traditional production methods Electro-Erosion, Chemical Etching and the basic characteristics of the laser cutting method used in industrial production.

**MKT4014 Industrial Measurement Systems (2 0 2)**

Basic concepts related to measuring, Functional descriptions and performance criteria of measurement devices, Sensors and transducers, Current, voltage and magnetic field measurement, Motion and distance measurement, Force, torque and shaft power measurement, Pressure and sound measurement, Flow and flowrate measurement, Temperature and heat dissipation measurement, Signal conditioning techniques, Noise-canceling designs, Micro and nanomekatronics measurement techniques.

**MKT4024 Industrial Design and Analysis (2 0 2)**

CATIA packaged software, Sketcher and Part Design exercises, modifying solid objects, surface analysis, modifying surfaces, Assembly Design and exercises, Drafting Workbench and dimensioning, using ANSYS packaged software to design models to do static, dynamic and heat stress tests, create mesh, applying forces and finding solutions.

***(Technical Elective Course-II)*****MKT4016 Artificial Intelligence (2 0 2)**

The requirement of artificial intelligence in mechatronics engineering and introduction of sample applications, Introduction to Fuzzy sets and membership functions, Classical sets and comparison of fuzzy clusters, Classical relations and fuzzy relations, Membership functions, Fuzzy sets properties, Mathematical operations in fuzzy clusters, Fuzzy rule-based systems, Fuzzy controllers and applications, Artificial neural networks fundamentals, Feedforward networks, Unsupervised learning, Artificial neural networks in communication, Neuro-rofuzzy controllers, Fuzzylogic based artificial neural networks, ANFIS. Sample applications and the use of Matlab-based design tools.

**MKT4018 Internet Programming (2 0 2)**

Installation and Testing of Application Software, Variables and Constants, Operators, Decision Control Structure, Loop Control Structures, User Defined Functions, Ready Functions, Arrays and Objects, Filing Procedures, Web Form Applications, Data Transfer Methods Between Pages, Database Operations-1, Database operations-2, -1 XML and Web services, XML, and Web services.

***(Technical Elective Course-III)*****MKT4020 Industrial Automation (2 0 2)**

The necessity of industrial automation, Revision of the back-feeding control, Revision of microprocessors and microcomputers, In industrial automation visual introduction of programmable logic controllers (PLC), PLC internal structure and hardware features, Memory areas, PLC operating system, PLC programming techniques, Timer and Counter programming, Data shift and copy, Data comparison loop and BCD and Binary calculation, Logic commands and Sub-program, Custom commands, Programmable terminal and driver identification working with PLC, PLC Network protocols and structures, Analog signal processing, PID block introduction and programming, PLC programming examples.

**MKT4022 Microprocessors and Programming (2 0 2)**

Microcomputers and microprocessors presentation, CPU architecture and microcomputer systems, PIC microcontrollers presentation, presentation of PIC application modules and devices, memory interface and addressing modes, Instruction set, Central Processing Unit, CPU, Input, Output Ports, I, O, Reset and Interrupts , Counter Module, Timer Interface Module, Analog-to-Digital Converter (ADC) Unit and programming, Digital-to-Analog Converter (DAC) unit and programming, Pulse Width Modulation (PWM) unit and programming, Serial Communication Interface Module, microprocessor PC communication and protocols , Instruction Set Samples, Examples of application.