ESKİŞEHİR OSMANGAZİ UNIVERSITY
ESKİŞEHİR VOCATIONAL SCHOOL

ELECTRONICS AND AUTOMATION DEPARTMENT MECHATRONICS PROGRAM

PROGRAM OF STUDY

***Applicable to students who start the program in 2014 and afterwards**

FIRST SEMESTER FRESHMAN YEAR FALL

241111001 TURKISH LANGUAGE - I

Description and features of language, languages of the world, Position of Turkish among other languages, historical development of Turkish, development of western Turkish, Atatürk's ideas and projects on Turkish, pronunciation and punctuation, language policies.

241011001 HISTORY OF TURKISH REVOLUTION &PRINCIPLES OF ATATÜRK I

The description of the term 'revolution'; major historical events in the Ottoman Empire to the end of World War I; World War I; a general overview of Mustafa Kemal's life; certain associations and their activities; arrival of Mustafa Kemal to Samsun; the cogress, gathering of the last Ottoman Assembly and the proclamation of the 'national oath'; opening of the Turkish Grand National Assembly; War of independence to the Victory of Sakarya; financial sources of the war of independence; grand counter-attack; Armistice of Mudanya; abolution of the Sultanate; Peace Conference of Lausanne.

241111003 ENGLISH I

Basic tenses, pronouns, prepositions, reading and listening parts and vocabulary of English.

241111004 MATHEMATICS-I

Numbers, ratio-proportion, LCM, GCD, absolute value, equations, functions, exponential, logarithmic, trigonometric and hyperbolic functions and plots, vector operations, matrices, matrix operations, equation solving with matrices.

241111015 MANUFACTURING PROCESSES AND INDUSTRIAL MATERIALS

General information about the evaluating equipment related to manufacturing. Basic turning on universal lathe. Basic milling on universal milling machine. Grinding the cutting tools on grinding machine. Basic welding with electrical welding machine. General properties of materials: elasticity, brittleness, hardness, strength, toughness, ductility, and plastisitisite. Low, medium, and high carbon steels. Cast iron. Alloys. Aluminum, copper, zinc, lead, antimony, brass, bronze and white metalproperties. Basic metallurgy: to obtain pig iron from ore, pig iron into steel, methods, molding, casting, forging and sheet methods. Percentageof carbon steels. Nickel, chromium and molybdenum alloys. Nonmetallic materials, composite material, fiber material is used, polymers. Behavior of materials under load, tensile elongation, diagrams.

241111016 PHYSICS

Unit systems, vectors, balance and momentum, laws of motion, work, power, energy, heat and temperature, channel and pipe flow, the pressure loss

241111007 USAGE OF BASIC INFORMATION TECHNOLOGIES

Computer Hardware and Software, Basic IT Concepts, Operating System, Web, MS Office Programs, Preparing petition, CV, Interview Techniques.

241111008 TECHNICAL DRAWING

General definitions in technical drawing; standard text and lines; geometrical drawings, projection methods, extraction of 3D faces, perspectives, perspective drawing, dimensioning

241111014 FUNDAMENTALS OF MECHATRONICS

Introduction to Mechatronics, Sensors and Transducers in Mechatronic Systems, Signal Processing in Mechatronic Systems, Visualization in Mechatronic Systems, Hydraulic and Pneumatic Actuators in Mechatronic Systems, Mechanical Actuators in Mechatronic Systems, Electrical Actuators in Mechatronic Systems, Control in Mechatronic Systems, Microprocessors, Programmable Logic Controllers (PLC) in Mechatronic Systems, Mechatronic System Design Procedure, Maintenance in Mechatronic Systems, Mechatronic Systems.

241111011 FIRST AID

Introduction, definition of first aid, aims and rules of first aid, transportation of sick and injured, first aid in bleeding, first aid in burns, first aid in frostbite, first aid in broken bones, dislocation and strains, cardio-pulmoner resuscitation, first aid for poisoning, first aid for animal bites, epilepsy, infectious diseases, and other first aid practices.

241111017 ORGANIZATIONAL BEHAVIOUR

Basic research methods, causes and effects of biases, attribution, happiness, depression, individualism, collectivism, conformity, gender, corruption, communitarianism, persuasion, groups and productivity, diversity and prejudice, conflict. Skills and strategies in organizational development and change, such as leadership, influence and control systems, group dynamics, and personal/organizational goals.

241111018 OCCUPATIONAL HEALTH AND SAFETY

To be aware of the rules of occupational health and safety laws in the industry

SECOND SEMESTER FRESHMAN YEAR SPRING

241112001 TURKISH LANGUAGE -II

Word information, word sorts, sentence and word order of Turkish, composition, kinds of oral and written composition, oral and written narration techniques, present problems of Turkish, text (poetry, novel, story, article, etc.) analyzing methods.

241012001 HISTORY OF TURKISH REVOLUTION & PRINCIPLES OF ATATÜRK II

Proclamation of the Republic, the Abolution of the Chaliphate, the Constitution of 1924, the Attempts of multi-party administration, the Sheikh Said Uprising, Other Reactions against the Republic, the Menemen Incident, the reforms in the field of education, law system, culture, economy, social life etc., the foreign relations of the Turkish Republic and the six principles of the Kemalist thought system, namely republicanism, nationalism, populism, statism, laicism and revolutionarism.

241112003 ENGLISH II

Reported speech, relative clauses, passive voice, conditionals, reading and listening parts and vocabulary of English.

241112004 MATHEMATICS -II

Vectors, complex numbers, vector form of complex numbers, the four arithmetical operations in cartesian form of complex numbers, polar and cartesian transformation of complex numbers, matrices, derivative and its applications, ıntegral and its applications.

241112014 BASIC OF STRENGTH, MECHANICS AND DYNAMICS

Basic concepts, SI units, vectors and vector analysis, force and moment, particle kinematics and rigid body kinematics, kinetics, work and energy, loadings, tensile and compressive strength, shear strength, bending strength, torsional strength.

241112015 DIGITAL ELECTRONICS

Number systems (binary, octal, decimal, hexadecimal),Number systems, codes (BCD, excess -3, Gray code), Logic gates, logical integrated circuits, Boolean algebra, Karnough maps, Encoders, Decoders, Multiplexers, demultiplexers, Adders, subtractors, flip – flops, Asynchronous counters, synchronous counters, ADCs, DACs.

241112020 QUALITY ASSURANCE AND STANDARDS

Quality concept, standard and standardization, standard's importance in production and service sector, management quality and standards, quality management systems, strategic management, process and resource management system.

241112019 PROFESSIONAL ETHICS

Examining the concepts of ethics and morality, Investigating the factors that play a role in the formation of morality, studying to examine the concept of professional ethics and social responsibility.

241112017 INDUSTRIAL ROBOTS

Definition and classification of robot, usage of robots, kinematics of robots, robot components and peripheral parts, robots and communication software, structure of robot arms, fixed and mobile robots, manipulators, palletising, packaging.

241112013 DIRECT CURRENT CIRCUIT ANALYSIS

Fundamental Electric Current Laws, Kirchoff's Laws, Node Analysis, Mesh Analysis, Source Transformation, Maximum Power Transition, Superposition Theorem, Thevenin Theorem, Norton Theorem, Inductor – Capacitor and their DC Response

241112016 COMPUTER AIDED DESIGN AND MANUFACTURING

Introduction to CAD Programs, Layers and lines, 2D geometric shapes drawing and editing, 3D drawing coordinate system and basic parameters, creation of draft models and drawings, Formation of solid and surface models, operations on solid and surface models, In the CAD program, machine tool bolts, rivets, gears, bearing drawings, Drawing and analysis of metal sheet and profile parts in CAD program, Technical picture symbol display in CAD program.

241112018 INDUSTRIAL APPLICATIONS I

Practical Training

THIRD SEMESTER SOPHOMORE YEAR FALL

241113018 3D PRINTING

3D prototyping technology and history, 3D prototyping technique and types, 3D prototyping working principle (Extruder and Hot Print Ucu, electronic, motor, software, hot printing area), 3D prototyping materials, 3D prototyping application areas, CAD (Computer Aided Design) and Modeling, CAD-3D program compatibility: STL File Formation, Printing Techniques and Higher Quality Printing, calibration, G-code.

241113015 SENSORS AND ACTUATORS

Digital sensors, analogue sensors, position sensors, ınductive sensors, capacitive sensors, laser sensors, optical sensors, temperature sensors, level sensors, pressure sensors, flow sensors, digital actuators, analogue actuators, electrical actuators, hydrolic – pneumatic actuators, mechanical actuators.

241113010 ALTERNATIVE CURRENT CIRCUIT ANALYSIS

Basic definitions about alternative current, definition of phase and ıts relations, complex representation of time domain amplitudes, polar forms of complex numbers, sinusoidal sources, R-L-C-Serial alternative current circuits, R-L-C-Parallel alternative current circuits, alternative current circuit analysis methods, rezonans circuit, sinusoidal continuous power equations, power and ıts companization, three-phase circuits.

241113012 ANALOGUE ELECTRONICS

Semiconductor technology, diodes – types of diodes, their application area, diodes in DC and AC circuits, clamper, regulator, clippine circuits, BJT transistors, analysis of BJT transistors in DC circuits, FET, MOSFET, OPAMP.

241113017 TROUBLE SHOOTING, MAINTENANCE AND REPAIR

Fault finding, maintenance and repair, mechatronic systems, security in finding a fault, Logical approach to fault finding, Electronic fault finding techniques, Sensors and transducers, signal conditioning components, fault finding in data display systems, Pneumatic and hydraulic

systems, mechanical actuation systems, electrical actuation systems, machine parts (gear wheels, miller, etc.) to find and maintain fault, Analogue / digital integrators and tests, Identification of defective electronic equipment, Electronic troubleshooting and maintenance techniques, Electronic card and material test methods, Difference between normal and periodic maintenance.

241113002 ELECRTIC MOTORS AND DRIVERS

DC Motors, AC Motors, Synchronous Motors, Asynchronous Motors, Servo - Motors, Laboratory Works.

241113003 INDUSTRIAL AUTOMATION

Automatic control circuit devices and applications, automatic control circuit symbols, control panels and ıntroduction to control circuits, project the power and control circuits, reading projects, asynchronous motor drive techniques, movement systems, changing rotation of asynchronous motors.

241113014 INDUSTRIAL MEASUREMENT TECHNICS

Introduction to industrial measurement, Calipers, Micrometers, DSC,DTA,Taper measuring, force measurement systems, surface roughness, SEM, TEM, XRD analysis techniques, Measuring mechanical properties (hardness, tensile-compression), Chemical Properties Measurement (corrosion, pH), Measurement instruments and current-voltage measurement, Condenser-coil-semi-conductor measurement, Measurements in power systems, Ground measurements, Measurements with the oscilloscope.

241113013 MACHINE ELEMENTS

General Principles and definitions, Overall strength info, Classification of machine elements, Fasteners, Fasteners, Resource links, Riveted joints, Welded and brazed joints, Bolted joints, Shafts, Rolling bearings.

241113011 AUTOMATIC CONTROL

Introduction to automatic control systems, History of Automatic Control, Types of Automatic Control Systems, Principles of Control, Open-Loop & Closed Loop Control Systems, Laplace Transformation and Its Properties, Tranfer Functions, Block Diagrams, Signal Flow GraphicTime Domain Analysis of Control Systems, 1st and 2 nd degree Systems, Time Responses, Types of Controllers, Steady State Error of Systems, Stability Analysis of Linear Feedback Control Systems, Stability, Routh Hurwitz Stability Criterias.

241113016 MECHATRONIC SYSTEMS IN AUTOMOTIVE

Introduction to automotive mechatronic systems, automotive parts and components description, understanding and analysis in automotive technical drawing, engine and environmental elements of mechatronics, mechatronics in automotive steering systems, testing and maintenance of automotive mechatronic systems, new developments in automotive (hybrid, smart vision system).

FOURTH SEMESTER SOPHOMORE YEAR SPRING

241114016 COMMUNICATION TECHNOLOGIES

Introduction to communication, Serial communication protocols, Parallel communication protocols, MODBUS, PROFIBUS, Ethernet, network technologies, Fiber optic, Communication between devices, Communication in industry.

241214012 COMPUTER AIDED MACHINE TOOLS

Computer controlled machine tools and their differences, CNC Lathe: Cutter types, specifications and usage places, Zeros on the parts and reset operation, CNC lathe working principle with control panel, CNC lathe application part and cutter tool reset display, Programming codes on CNC lathe, CNC milling cutter types, features and usage places, Zeros on the parts and reset operation, Working principle of CNC milling machine and control panel, CNC milling machine parts and cutting tool zeroing, Programming codes on CNC milling machine.

241114019 AVIATION MECHATRONICS

Basic mechatronics definitions, control hardware in mechatronics, electronics hardware in mechatronics system, flight control system, propulsion system, avionics system, environmental systems, UAV (Unmanned Aero Vehicles).

241114002 HYDROLIC AND PNEUMATIC SYSTEMS

Hydraulic systems, principles of hydraulics, sı units, hydraulic pressure and force, solving problems on force transmission in hydrolic circuits, hydraulic fluids, hydraulic circuits and hydraulic elements, hydrolic pumps and motors, hydrolic cylinders, direction control valves, pressure control and flow fontrol valves, hydraulic connectors, hydraulic sealing components, properties of air, pneumatic circuits and pneumatic elements, compressors, cylinders, pneumatic motors, pneumatic valves, FRLs.

241114018 STATISTICS

Fundamentals of statistics, Data collection, management and presentation, Central tendency, Measure of dispersion, Indexes, Probability theory, Random variables, Regression, Trend and Correlation analysis.

241114010 PROGRAMMABLE LOGIC CONTROLLERS

Basic technology of PLC, PLC units, PLC interface program, PLC interface, PLC programming, PLC interface, PLC programming, Ladder diagrams, programming PLC with ladder diagrams, Programming PLC with ladder diagrams, digital inputs / outputs on PLC, Analogue inputs / outputs on PLC, Panels with PLC

241114017 MECHATRONICS IN RAILWAY SYSTEMS

Introduction to railway systems, mechatronics ın railway systems, ıntroduction to railway signalization systems, railway signalization equipments, point machines, railway signalization equipments, signals, level crossings, railway signalization equipments, track circuits, axle counters, Central Traffic Control (Ctc), railway signalization rules, convensional lines technology and examples, accelerated lines technology and examples.

241114015 RENEWABLE ENERGY

Definition and importance of energy, Relation between environment and energy, Non-renewable energy sources, Classification of renewable energy sources, Solar energy, Wind energy, Hydraulic energy, Biomass energy, Hydrogen energy, Geothermal energy, Novel technologies in the field of energy, Energy efficiency and energy saving.

241114011 MICROCONTROLLER BASED CONTROL

Microcontroller hardware, uploading program to microcontroller, designing algorithm, flow diagrams, memory and registers in microcontroller, microcontroller program codes, fundamental input output programs, program compiling.

241114013 PROJECT

Project researching, designing, developing, presenting

241114014 INDUSTRIAL APPLICATIONS II

Practical Training